TABULAR SYNOPSIS

OF THE

PROPERTIES AND APPLICATION

OF THE

DYESTUFFS

OF THE

FARBENFABRIKEN

VORM.

FRIEDR. BAYER & CO. ELBERFELD.

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Cotton.

1. **Benzidine colours** which dye cotton direct:

Reds: Benzo Purpurine 1 B, 4 B, 4 B conc., 6 B, 10 B
Benzo Rhoduline Red B, 3 B
Benzo Fast Pink 2 B L
Benzo Fast Red L, G L
Benzo Fast Scarlet 4 B S, 5 B S, 8 B S, G S, 22195
Benzo Red S G, 10 B
Benzo Nitrol Bordeaux G (Paranitraniline)
Brilliant Congo G, R
Brilliant Geranine B, 3 B
Brilliant Purpurine R, 4 B
Congo Red, 4 R
Congo Rubine
Diazo Rubin B (Dev. A)
Delta Purpurine 5 B, 7 B
Diamine Red B, 3 B
Diazo Bordeaux (Dev. A*)
Geranine B B, G
Hessian Purple N
Rose Azurine B, G
Trona Red 3 B, 7 B, G G
Primuline Yellow, superfine (Dev. A)

Oranges: Benzo Orange R
Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Orange T A
Pluto Orange G
Toluylene Orange G

Yellows: Brilliant Yellow
Cloramine Yellow G G, M, H W
Chrysamine G, R, G S, R S
Chrysophenine G, G S, R
Curcumine S
Direct Yellow R, R extra
Thiazole Yellow G, R
Primuline Yellow, superfine

Greens: Benzo Dark Green B, G G

*) (Dev. A) = Developer A.

Greens: Benzo Green B B, G, C
Benzo Olive
Brilliant Benzo Green B

Blues: Azo Blue
Benzo Azurine G, 3 G, R, 3 R
Benzo Blue 2 B, 3 B, B X, R W, 2 R, 4 R
Benzo Black Blue G, 5 G, R
Benzo Chrome Navy Blue W R
Benzo Chrome Black N, B
Benzo Chrome Black Blue B
Benzo Cyanine B, 3 B, R
Benzo Fast Blue B, B N, G, R, 5 R
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Sky Blue, conc., 4 B
Benzo Red Blue G, R
Brilliant Azurine B, 5 G, 2 R, 5 R
Brilliant Benzo Blue 6 B, 6 B S
Chicago Blue B, R
Congo Blue 2 B
Diazo Black B, 3 B, B H N, B H N extra, R, R extra (undiazotised)
Diazo Blue, 3 R (Dev. A)
Diazo Blue Black
Diazo Navy Blue 3 B (Dev. A)
Diazo Fast Black B direct and Dev. A
Diazo Indigo Blue B, M, R, B R extra, 2 R L, 3 R, 4 R L (Dev. A)
Diazo Red Blue 3 R (Dev. A)
Diazurine B, (Dev. A)

Violets: Azo Violet
Benzo Fast Violet R
Benzo Bordeaux 6 B
Benzo Violet R, R L extra
Chloramine Violet R
Congo Corinth B, G
Heliotrope, B B

Browns: Benzo Brown B, B X, N B X, B R, G, N B, G G, R extra, N B R, 5 R, R C, D 3 G extra
Benzo Chrome Brown B, B S, C R, G, R, 3 R, 5 G
Benzo Dark Brown

Browns: Benzo Nitrol Brown G, R O, 2 R (Paranitraniline)
Diazo Brown G, R extra
Diazo Brilliant Black B, R
(diazotised and developed with soda)
Direct Bronze Brown
Direct Fast Brown B, G G
New Toluylene Brown B, B B O, M
Pluto Brown R, G G, N B
Toluylene Brown B, B B O, M, R

Greys: Benzo Chrome Black N
Benzo Fast Grey
Benzo Grey, S extra
Diazo Black B H N
Pluto Black B, G, R

Blacks: Benzo Black, S extra
Benzo Chrome Black B, G, N (chrome, copper)
Benzo Fast Black (direct and Dev. A and Dev. H)
Benzo Nitrol Black B, T (Paranitraniline)
Diamine Black R O, R O O (Dev. A)
Diazaethyl Black B, R (Dev. B*)
Diazo Black B, 2 B, 3 B, B H N, B H N extra, G, H, R, R extra (Dev. A)
Diazo Brilliant Black B, R (Dev. A)
Diazo Fast Black 3 B, G, B Z (Dev. A), B H X (direct and Dev. A and Dev. H**). (Dev. A and Dev. F***), S D (Dev. A) (Dev. H) (Dev. F), B (Dev. H) (Dev. F)
Direct Black V T
Direct Blue Black B, 2 B, N
Direct Deep Black E, E extra, E W, E W extra, R W, R W extra, R, G, T
Pluto Black A, A extra, B, 3 B extra, G, R, F R, C R, B S extra, K, F extra, F extra conc., L extra, C F extra, T G extra, T G extra conc.

2. **Benzidine colours** which are especially remarkable for their **good solubility:**

Reds: Benzo Fast Scarlet 5 B S
Benzo Purpurine 1 B
Benzo Red S G

*) Dev. B = Developer B. **) Dev. H = Developer H.
***) Dev. F = Developer F.

Reds: Benzo Rhoduline Red B
Brilliant Congo G, R
Brilliant Geranine B, 3B
Brilliant Purpurine 4B, R
Congo Red, 4R
Diazo Bordeaux

Oranges: Benzo Orange R
Congo Orange G, R
Mikado Orange G
Pluto Orange G

Yellows: Brilliant Yellow
Chloramine Yellow GG, M. HW
Direct Yellow R, R extra
Thiazole Yellow G, R
Yellow PR, superfine

Blues: Benzo Blue 2B, 3B
Benzo Chrome Black Blue B
Benzo Cyanine 3B
Benzo Sky Blue
Brilliant Azurine B
Brilliant Benzo Blue 6B, 6BS
Diazo Red Blue 3R
Diazurine B

Greens: Benzo Dark Green B
Benzo Olive

Violets: Benzo Fast Violet R
Benzo Violet R
Chloramine Violet R
Heliotrope BB

Browns: Benzo Brown B, BR, BX, G, GG, NB, NBR, NBX, R extra, 5R
Benzo Chrome Brown B, R, 3R
Direct Fast Brown B, GG

Greys: Benzo Fast Grey

Blacks: Benzo Fast Black
Diazo Black B, 2B, 3B, BHN, BHN extra, G, H, R, R extra
Direct Deep Black E, E extra, G, R, RW, RW extra, T

Directions for Dyeing Benzidine Colours.

As most Benzidine colours in conjunction with the lime in the water, form insoluble lime salts, which,

are of no value in dyeing, hard water should therefore be neutralised with soda (or soap). (The scum formed by the employment of soap must be skimmed off first, so as to avoid spots on the goods.) It is also advisable, in dissolving Benzidine colours, to use water free from lime.

Benzidine colours fall on unbleached cloth, or such that has merely been boiled off, better than on chemicked material. The dyebaths are not exhausted, so that for subsequent baths $\frac{1}{8}$—$\frac{1}{4}$ less colour is required than that used for the first bath. It is therefore more economical to dye in standing baths. Subsequent additions of colour to the dye liquor have to be calculated according to the quantity of colour lost in lifting the goods.

Benzidine colours are dyed on cotton as a rule with Glauber's or common salt. (See No. 4.) Some dyestuffs also require a certain addition of alkali (see No. 3); others on the contrary are unfavourably affected by an addition of alkali (soda, etc.); some on the other hand are dyed best with soda, without any salt (see No. 5). Most of these very easily soluble Benzidine colours require a comparatively large addition of common salt to the dyebath. For light shades phosphate of soda or soap should be employed, whereby clearer shades ensue.

When dyeing Benzidine colours, the liquors should be kept as short as possible unless for very light and delicate shades, i. e. not to take more water than is necessary to work the goods in; sufficient water, however, must be taken to keep the dyestuff in solution. In hank dyeing the ratio of dye liquor should as a rule be 20 : 1 of goods, and it is best to use indirect steam.

For dark shades take on an average 2—4 oz. Glauber's salt crystals or 1—2 oz. common salt per gallon water, and eventually $\frac{1}{8}$ – $\frac{1}{3}$ oz. soda ash or even up to $\frac{1}{2}$ oz. soda ash per gallon water, which latter quantity, however, is very seldom necessary.

Dyers who are accustomed to work according to percentages will find the following proportions a very good guide in dyeing (ratio of dye liquor 20 : 1 of goods):

25—50 % Glauber's salt crystals or
2—5 % soda ash or
10—20 % common salt;

100 parts soda ash correspond to 270 parts soda crystals: 100 parts calcined Glauber's salt are equivalent to about 220 parts Glauber's salt crystals, and 50 parts common salt correspond to about 110 parts Glauber's salt crystals.

For short liquors and light shades the additions have to be eventually increased.

Most Benzidine colours fall on the cotton even below the boiling point. Enter the goods at a temperature between 122° Faht. and the boiling point. Loose cotton is dyed in open vessels and oftentimes in machines; yarns in dye vessels or in machines, piece goods 1) in the jig, 6 ends for light shades, and 8—12 ends for dark shades 2) in the beck at the boil for 1 hour, and 3) on the slop-padding machine. After dyeing, rinse if necessary.

For Benzidine colours which dye in a cold bath please refer to No. 8; and for colours, adapted for mercerised cotton and the directions for dyeing (see No. 36). The directions for dyeing Trona colours are given on page 11.

3. **Benzidine colours** which dye well in a bath **containing Glauber's or common salt** with an addition of **soda:**

The products **underlined** are those **most adapted** for the above mentioned method of dyeing.

Reds: Benzo Fast Pink 2BL

Benzo Fast Red L, GL

Benzo Fast Scarlet 4BS, GS, 8BS, 5BS, 22195

Benzo Purpurine 1B, 4B, 6B, 10B, 4B conc.

Benzo Red SG, 10B

Benzo Nitrol Bordeaux G

Benzo Rhoduline Red B und 3B

Brilliant Congo R

Brilliant Geranine B, 3B

Brilliant Purpurine R, 4B

Reds: Congo Red, 4 R
Congo Rubine
Chloramine Red 8 B S
Delta Purpurine 5 B, 7 B
Diamine Red B, 3 B
Diazo Bordeaux
Diazo Rubine B
Geranine B B, G
Hessian Purple N
Rose Azurine B, G

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Orange T A
Pluto Orange G
Toluylene Orange G, R

Yellows: Brilliant Yellow
Chloramine Yellow G G, M, H W
Chrysamine G, R, G S, R S (Glauber's salt, soda)
Chrysophenine G, G S, R
Curcumine S
Direct Yellow R, R extra
Thiazole Yellow G, R
Yellow P R, superfine

Greens: Benzo Dark Green B, G G
Benzo Green B B, G
Benzo Olive
Brilliant Benzo Green B

Blues: Azo Blue
Benzo Azurine G, 3 G, R, 3 R
Benzo Black Blue 5 G
Benzo Blue 2 B, 3 B, B X, 2 R, 4 R, R W
Benzo Chrome Black Blue B
Benzo Copper Blue B
Benzo Cyanine B, 3 B, R
Benzo Fast Blue B, B N, G, R, 5 R
Benzo Red Blue G, R

Blues: Benzo Sky Blue, concentrated, 2 B
Brilliant Azurine B, 5 G, 2 R, 5 R
Brilliant Benzo Blue 6 B
Chicago Blue B, R
Congo Blue 2 B
Diazo Blue, 3 R
Diazo Blue Black
Diazo Indigo Blue B, R, M, B R extra, 2 R L, 3 R, 4 R L
Diazo Navy Blue 3 B
Diazo Red Blue 3 R
Diazurine B

Violets: Azo Violet
Benzo Bordeaux 6 B
Benzo Fast Violet R
Benzo Violet R, R L extra
Congo Corinth B, G
Diazo Violet R
Heliotrope, B B

Browns: Benzo Brown B, B R, B X, G, G G, N B, N B R, N B X, R extra, 5 R, R C, D 3 G extra
Benzo Chrome Brown B, B S, C R, G, 5 G, R, 3 R
Benzo Nitrol Brown G, R O, 2 R
Diazo Brown G, R extra
Direct Bronze Brown
Direct Fast Brown B, G G
New Toluylene Brown B, B B O, M
Pluto Brown R, N B, G G
Toluylene Brown B, B B O, M, R

Greys: Benzo Fast Grey
Benzo Grey
Benzo Grey S extra
Direct Black V T

Blacks: Benzo Chrome Black B, N
Benzo Black S extra
Diamine Black R O, R O O
Diazethyl Black B, R

Blacks: Diazo Black B, 2 B, 3 B, B H N, B H N extra, G, H, R, R extra
Diazo Blue Black
Diazo Brilliant Black B, R
Diazo Fast Black B H N, S D, B Z, B
Direct Blue Black B, 2 B, N
Direct Deep Black E, E extra, E W, E W extra, G, R, R W, R W extra, T
Pluto Black A, A extra, B, 3 B extra, R, G
F R, B S extra, C R, F extra, F extra conc., L extra, C F extra, T G extra, T G extra conc.

1. **Benzidine colours** which dye best with the addition of **10—20 % common salt** or **25—50 % Glauber's salt crystals** alone without any soda:

The products **underlined** are those **best adapted** for this method of dyeing.

Reds: Benzo Nitrol Bordeaux G
Benzo Purpurine 10 B
Benzo Rhoduline Red B, 3 B
Brilliant Congo G, R
Brilliant Geranine B, 3 B
Brilliant Purpurine R, 4 B
Congo Red, 4 R
Congo Rubine
Delta Purpurine 5 B, 7 B
Diazo Bordeaux
Diamine Red B, 3 B
Geranine B B, G
Hessian Purple N
Rose Azurine B, G
Yellow P R, superfine (Dev. A)

Oranges: Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Orange T A
Pluto Orange G
Toluylene Orange G

Yellows: Brilliant Yellow (acetic acid)
Chloramine Yellow G G, M, H W
Chrysophenine, G S
Curcumine S
Direct Yellow R, R extra
Thiazole Yellow G, R
Primuline Yellow, superfine

Greens: Benzo Dark Green B, G G
Benzo Green B B, G, C
Benzo Olive
Brilliant Benzo Green B

Blues: Benzo Blue 2 B, 3 B, B X, 2 R, 4 R, R W
Benzo Cyanine B, 3 B, R
Benzo Sky Blue, conc., 4 B
Benzo Black Blue 5 G
Brilliant Azurine B, 2 R, 5 R
Brilliant Benzo Blue 6 B, 6 B S
Chicago Blue B, R
Diazo Blue, 3 R
Diazo Blue Black
Diazo Navy Blue 3 B
Diazo Red Blue 3 R
Diazurine B

Violets: Azo Violet
Benzo Fast Violet R
Benzo Violet R
Chloramine Violet R
Heliotrope B B

Browns: Benzo Brown B, B R, B X, G, G G, N B, N B R, N B X, R extra, 5 R, D 3 G extra
Benzo Chrome Brown B, B S, C R, G, 5 G, R, 3 R
Benzo Dark Brown
Benzo Nitrol Brown 2 R
Diazo Brown G, R extra
Direct Bronze Brown
Direct Fast Brown B, G G

Browns: New Toluylene Brown B, BBO, M
Pluto Brown GG, NB, R
Toluylene Brown B, BBO, M, R

Greys: Benzo Fast Grey
Benzo Grey S extra

Blacks: Benzo Fast Black
Benzo Nitrol Black B, T
Benzo Black S extra
Diazethyl Black B, R
Diazo Blue Black
Diazo Brilliant Black B, R
Direct Blue Black B, N
Direct Deep Black E, E extra, EW, EW extra, G, R, RW, RW extra, T
Pluto Black BS extra, FR, CR

5. **Benzidine colours** which **dye best with 5—10% soda ash alone without any salt:**

Blues: Benzo Indigo Blue
Benzo Navy Blue B
Benzo Black Blue G, R

Greys: Benzo Grey

Blacks: Benzo Chrome Black B, N
Benzo Black
Diazo Fast Black 3B, G
Pluto Black B, G, R

6. **Benzidine colours** which **dye** with the **addition** of **caustic soda** and an **excess of salt** (Glauber's or common salt):

Reds: Trona Red 3B, 7B, GG

Directions for dyeing Trona Colours.

Cotton is dyed with Trona Colours for one hour at the boil with the addition of caustic soda (soda lye) and salt, and after the goods have been wrung out or squeezed, without any rinsing, acidulate with 1% sulphuric acid solution — 3 gills (1 lb.) sulphuric acid per 10 gallons water —, and then **rinse thoroughly.** (If the goods are rinsed directly after dyeing, before they have been acidulated, the dyestuff would be stripped to a great extent.)

For a 6 % shade the following proportions will serve as a guide:

For dyeing 100 lbs. of cotton.

6 lbs. Trona Red

4 1/2 lbs. caustic soda or 13 lbs 3 1/2 oz. soda lye 76° Tw.

100 lbs. common salt or 200 lbs. Glauber's salt cryst.

Dissolve the colour in boiling water together with the requisite quantity of caustic soda or soda lye under constant stirring, then pour the solution into the boiling dye liquor (which should be about 150 gallons), add the quantity of salt stated, boil up and dye as stated above. After dyeing wring out and enter a bath consisting of

200 gallons water and
20 lbs. sulphuric acid,

give 5 ends, rinse well and dry.

The above proportions refer to the **first bath;** for subsequent baths the additions of dyestuff and soda lye stated should be reduced about 1/3rd of the quantity stated for the first bath. The addition of salt necessary for standing baths corresponds with the quantity of liquor lost in lifting the goods. As a rule 1/5th of the quantity of salt taken for the first bath is sufficient.

7. **Benzidine colours** which can be dyed in **conjunction with one another,** and which in combinations produce fashion able shades and always **dye level.**

Reds: Benzo Fast Red GL
Benzo Fast Scarlet 4BS, GS
Benzo Purpurine 4B, 4B conc., 6B, 10B

Oranges: Congo Orange G, R
Pluto Orange G
Benzo Fast Orange S

Yellows: Chrysophenine, GS

Greens: Benzo Dark Green B, GG
Benzo Green BB, G

Blues: Benzo Azurine G, 3G, R
Benzo Black Blue 5G
Benzo Chrome Black Blue B
Benzo Sky Blue
Diazo Black BHN

Violets: Benzo Violet R

Browns: Pluto Brown GG, NB, R
Blacks: Benzo Fast Black
Pluto Black BS extra, CR

8. **Benzidine colours** which are **well adapted for dyeing in a cold** or a **luke warm bath:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Red GL
Benzo Red SG
Benzo Rhoduline Red B
Brilliant Geranine B, 3B
Brilliant Purpurine R, 4B
Congo Red, 4R
Congo Rubine
Geranine BB, G
Hessian Purple N
Oranges: Chloramine Orange G
Congo Orange G
Mikado Orange G
Pluto-Orange G
Toluylene Orange G
Yellows: Chloramine Yellow GG, M, HW
Chrysophenine G, GS, R
Curcumine S
Direct Yellow R, R extra
Greens: Benzo Dark Green B
Brilliant Benzo Green B
Blues: Benzo Blue 2B, 3B, 4B
Benzo Chrome Black Blue B
Benzo Sky Blue, conc., 4B
Benzo Red Blue G, R
Brilliant Benzo Blue 6B, 6BS
Diazo Black BHN, R extra
Violets: Benzo-Bordeaux 6B
Benzo Violet R, RL extra
Heliotrope BB
Browns: Benzo Nitrol Brown G, 2R
Pluto Brown R, NB, GG
Greys: Benzo Fast Black
Blacks: Direct Black VT
Pluto Black BS extra

9. **Benzidine colours** which when **diazotised** and **developed** on the fibre are rendered **faster to washing**:

Reds: Diazo Bordeaux (Dev. A*)
Diazo Rubin (Dev. A)
Yellow PR (Dev. A) Dev. B**)

Oranges: Primuline Yellow (Dev. F***)

Yellows: Primuline Yellow (Dev. J****)

Blues: Benzo Azurine 3R (Dev. B)
Brilliant Azurine 2R (Dev. A)
Diazo Black BHN (Dev. G*****)
Diazo Blue 3R (Dev. A)
Diazo Fast Black B, 3B (Dev. A)
Diazo Indigo Blue B, M, R, BR extra, (Dev. A) 2RL, 3R, 4RL
Diazo Navy Blue 3B (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazurine B (Dev. A)

Browns: Benzo Brown BR
Diazo Brown G, R extra (Dev. A) (Dev. H) (D. E)******)
Direct Deep Brown B (Dev. A) (Dev H)
Pluto Brown R, NB, 2G (Dev. E)

Greys: Benzo Blue 2B, 3B (Dev. A)
Diazo Blue Black (Dev. A)

Blacks: Benzo Fast Black (Dev. H)
Diamine Black RO, ROO (Dev. A)
Diazethyl Black B, R (Dev. B)
Diazo Black B, 2B, 3B, BHX, G, H, R, R extra (Dev. A) (Dev. H)
Diazo Blue Black (Dev. A)
Diazo Brilliant Black B, R (Dev. A) (Dev. B)
Diazo Fast Black 3B, G (Dev. H) (Dev. A) BZ, SD, BHX, (Dev. A), (Dev. H)
Direct Deep Black E, E extra, G, RW, RW extra (Dev. A) (Dev. H) (Dev. F) Dev. A), B (Dev. H.) (Dev. F)
Pluto Black L extra (Dev. A) (Dev. H).

*) (Dev. A) = Developer A
**) (Dev. B) = Developer B
***) (Dev. F) = Developer F
****) (Dev. J) = Developer J
*****) (Dev. G) = Developer G
******) (Dev. E) = Developer E

Directions for Diazotising and Developing Benzidine colours.

Diazotising Bath.

After the cotton has been dyed with the diazotisable Benzidine colour, rinse in cold water, containing a slight addition of hydrochloric acid, wring out or hydroextract, and then work continually for 15—20 minutes in a cold acidulated bath containing nitrite of soda. Prepare this bath as follows: for 100 lbs. cotton 2—3 lbs. nitrite of soda are dissolved in 150—200 gallons water at 68—77° Faht., to which add 6—10 lbs. commercial hydrochloric acid (about 32° Tw.) — or 3 1/3—5 1/2 lbs. sulphuric acid 166° Tw. — This solution is best prepared in wooden vessels. Hydrochloric acid produces somewhat brighter shades than sulphuric acid.

The nitrite baths can be preserved for a considerable time, and for subsequent lots only 1/3 the original amount of nitrite and acid is required to replenish same. During the whole of the diazotising process the bath should always smell strongly of nitrous acid. For light shades 2 lbs. of nitrite of soda and 7 lbs. hydrochloric acid (or 2 lbs. sulphuric acid 166° Tw.) will be found sufficient.

In most instances it will be sufficient to work for 15 mins. in the nitrite bath; only in the case of Diazo Brilliant Black B & R, Diazo Black H, Diazo Brown R extra and Diazo Indigo Blue B is it necessary to work for 1/2 hour. After diazotising, the goods are allowed to drain, then enter the cold developing bath, to which if possible add 1—2% soda. When working with Developers C, E and H the goods should be carefully rinsed before entering the developing bath.

Care should be taken that the goods do not become perfectly or partly dry, as this also affects the Diazo compound, causing the formation of streaks.

The diazotising process, especially when working with Primuline, should not be carried out under the direct influence of sunlight, as on account of the extreme susceptibility of the Diazo compound to the sunlight, it would become destroyed, thereby causing spots and streaks to appear when subsequently developed.

Developing Baths.

1. Developer A (Beta Naphtolate of soda).

Enter the diazotised goods into a bath, prepared as follows: For 100 lbs. cotton,

1—2 lbs. Developer A dissolved in
150—200 gallons water at 85—95° Fahr. together with
½ lb. soda ash.

Work the yarn in this bath for 20—25 mins., then rinse, and it is more advantageous to soap slightly. For subsequent baths ¾—1½ lbs. Developer A and ¼ lb. soda are sufficient to replenish same. The developing bath can also be prepared as follows:

Dissolve:

½ lb. Beta Naphtol in
7½—13 oz. soda lye 76° Tw. and as above described pour this solution into
150—200 gallons water.

An excess of soda lye should be avoided, as certain shades are affected detrimentally by it; for this reason Developer A is to be preferred, especially when dveing Diazo Brown G, R extra, Diazo Navy Blue 3 B, Diazo Red Blue 3 R, Diazo Brilliant Black B, R, and Diazethyl Black B, R.

2. Developer B (patented) Primuline-Bordeaux Developer.

For 100 lbs. cotton, dissolve

1¼ lbs. Developer B in
30 gallons water,

(if necessary with an addition of some hydrochloric acid in case Developer B should dissolve turbid. Add the diluted hydrochloric acid in small quantities under vigorous stirring until the solution is no longer turbid.) This solution should be made up with cold water to

150—200 gallons.

3. Developer C (Meta Phenylene Diamine hydrochloride); Developer E (Meta Phenylene Diamine Base dissolved in water); Developer H (Meta Toluylene Diamine Base).

These developers are chiefly suited for the production of browns and brownish blacks: they all three produce the same shades. Developer H, compared with the old Developer C, has the advantage that it does not froth when adding soda, is ½th stronger and is con-

sequently cheaper; it should therefore be preferred in any case.

Developer C.

Dissolve:

9½—14½ oz Developer C with
6—8 oz soda ash in
10 gallons water, and make up to
150—200 gallons water.

Developer E liquid.

Pour

3½—5¼ lbs. Developer E liquid into
150—200 gallons water, if necessary with the addition of
2½—8 oz. soda ash.

Developer H.

Dissolve: ½—¾—1½ lbs. Developer H in
150—200 gallons water, if necessary with an addition of
2½—8 oz. soda ash.

4). **Resorcine Developer,** or **Developer F.**

For 100 lbs. cotton dissolve thoroughly
10 oz. Resorcine, Developer F, in
22 oz. soda lye 76° Tw. and make up to
150—200 gallons water.

5). **Developer G.** (Blue Developer).

For 100 lbs. cotton stir up
1¾ lbs. Developer G in
2 gallons cold water.

As soon as the mixture ceases to froth add
5—10 gallons water,
bring to the boil and stir until completely dissolved, then allow to cool down, and make up to
150—200 gallons.

6). **Phenole Developer** or **Developer J.**

For 100 lbs. cotton, dissolve
6½ oz. Phenole with the addition of
12¾ oz. caustic soda 76° Tw.
and make up with water to
150—200 gallons.

All these developing baths are stable and can be preserved for some time; to replenish standing baths ⅔rds. to ¾ths of the original quantities of Developer and other ingredients are sufficient.

In order to obtain fuller shades a combination of the different Developers is often employed, as a rule Developer A with F, or Developer A with H and Phenole. Developer B is not at all suited for combining with others.

The treatment of the goods in the developing bath, is in all cases the same, and is carried out as follows: Work the goods until no alteration in shade takes place, this requiring at the most 15—20 minutes, afterwards rinse (if necessary soap and rinse) and dry.

When using Developers C, E or H it is advisable to slightly acidify the wash water.

Yellower shades can also be produced with Developers C, E or H according to the following method: Acidify the developer with acetic acid until the solution turns blue litmus paper red, enter the well rinsed diazotised goods in this acid bath, work for 15—20 minutes, then rinse and dry.

Alkaline developers are to be preferred, as shades, prepared with acid developers are easily liable to rub.

Diazotised and developed shades are in any case possessed of **greater fastness to washing.**

No. 9a. **Benzidine colours, which when diazotised and developed with soda, produce shades fast to washing:**

Browns: Diazo Brown R extra
Diazo Brilliant Black B, R

Yellow: Yellow P R

After the cotton has been dyed with the above Benzidine colours diazotise as stated under No. 9, then work for 15 minutes in a warm bath at 100—120° Faht. containing: 5—6 lbs. soda ash per 150—200 gallons water, rinse and dry.

10. **Benzidine colours** which when dyed on cotton are rendered **faster to light** by an **after-treatment with 1—3% copper sulphate:**

Yellows: Chrysamine G, R, G S, R S

Blues: Benzo Azurine G, 3 G, R
Benzo Black Blue R
Benzo Blue 2 B, R W, 2 R
Benzo Cyanine 3 B

Blues: Benzo Indigo Blue
Benzo Sky Blue
Brilliant Azurine 5 G
Brilliant Azurine 2 R (Dev. A)
Brilliant Benzo Blue 6 B, 6 BS
Diazo Blue (Dev. A)
Diazo Blue 3 R (Dev. A)
Diazo Indigo Blue R, 3 R (Dev. A)
Diazo Navy Blue 3 B (Dev. A)
Violets: Azo Violet
Chloramine Violet R
Blacks: Diazo Fast Black B (Dev. H), 3 B, G (Dev. A)
Diazo Black 3 B (Dev. A), B (Dev. H)
Brown: Pluto Orange G

After-treat the **above mention Benzidine colours** in a fresh bath containing 1—3 % **copper sulphate** for 20—30 mins. at 120° Faht. (if necessary with an addition of a little acetic acid), wash and dry.

In many cases a short treatment with copper sulphate in the cold rinsing bath is quite sufficient.

11. **Benzidine colours** which are rendered **faster to washing** by an **after-treatment** with **2—3 % bichromate of potash** or **fluoride of chrome:**

Yellows: Chrysamine G, R, G S, R S
Greens: Benzo Green B B, G (3 % fluoride of chrome)
Benzo Dark Green B, G G (3 % fluoride of chrome)
Brilliant Benzo Green B (3 % fluoride of chrome)
Blues: Benzo Indigo Blue
Browns: Toluylene Orange G
Pluto Orange G
Blacks: Benzo Chrome Black B, N
Benzo Chrome Black Blue B
Direct Blue Black B, N
Direct Deep Black E, G, R W
Pluto Black G, C R

After-treat the **above mentioned Benzidine colours** with 2—3 % bichrome[*] or fluoride of chrome for 30 minutes in a hot or boiling bath (if necessary

[*]) Instead of bichrome, sodium chromate can of course also be taken.

with an addition of a little acetic acid), then wash and dry.

12. **Benzidine colours** which when **after-treated with 2—3% copper sulphate and 2—3% bichromate of potash** are rendered **faster to light and washing:**

Green: Benzo Olive
Yellows: Chrysamine G, R, GS, RS
Blues: Benzo Azurine G
Benzo Indigo Blue
Browns: Benzo Chrome Brown B, BS, CR, G, 5G, R, 3R
Diazo Brown R extra
Direct Deep Black E, E extra, EW
EW extra, RW, RW extra
Pluto Black BS extra
Pluto Orange G
Toluylene Orange G
Greys: Benzo Chrome Black Blue B
Blacks: Benzo Chrome Black B, N
Benzo Chrome Black Blue B

After-treat the **above mentioned Benzidine colours** with 2—3% copper sulphate and 2—3% bichrome in a fresh hot or boiling bath for ¼ to ½ hour. If the liquor is not clear, then add some acetic acid (2—4% according to the hardness of the water) until the precipitate has perfectly dissolved: afterwards wash and dry.

13. **Benzidine colours** which can be employed on cotton as a **bottom** for **topping with Aniline salt:**

Reds: Congo Red
Greens: Benzo Dark Green B
Blues: Benzo Blue BX
Benzo Chrome Black Blue B
Blacks: Benzo Chrome Black B, N
Diamine Black RO
Diazo Black BHN
Direct Deep Black E, E extra, G, T, RW, RW extra, EW, EW extra

The shades of many black and blue Benzidine colours are rendered deeper and faster when topped with Aniline Black; the fibre also remains stronger than when dyed with Aniline oxydation Black. The shades are

faster to rubbing than those produced according to the one bath Aniline Black process.

Enter the goods dyed with Benzidine colours into a cold bath (volume of dye liquor 30 : 1 of goods) prepared as follows:

4 % bichromate of potash
2 % copper sulphate
3 % Aniline salt
4 % sulphuric acid 142° Tw.

Work the goods in this cold bath for about ½ hour, bring the bath gradually within the next ½ hour to 140—160° Faht. and continue working for 1 hour at this temperature. After dyeing allow the goods to cool down in the open air, then wash well (and if necessary soap), rinse and dry.

Remarks: Bichrome and copper sulphate should be dissolved separately in as little hot water as possible, so as not to increase the temperature of the cold Aniline bath, and both these solutions should be added to the bath directly before entering the cotton. — Occasionally certain Red and Green Benzidine colours are used for bottoming purposes.

In place of Aniline salt, the equivalent quantity of Aniline oil (2.16 %) and hydrochloric acid (about 2.82 % 32° Tw.) can also be taken.

14. **Benzidine colours** which when **afterwards treated** with **diazotised Paranitraniline** (Benzo Nitrol) are rendered **faster to washing:**

Red: Benzo Nitrol Bordeaux G
Oranges: Chloramine Orange G
Yellows: Chloramine Yellow M, G G, H W
Direct Yellow R, R extra
Yellow P R
(cannot be developed with diazotised Paranitraniline, can be used only for shading purposes.)
Greens: Chicago Blue B, R
Browns: Benzo Brown B, B X, B R, G, N B, N B R, N B X, 5 R, R extra
Benzo Nitrol Brown G, R O, 2 R
Diazo Bordeaux
Diazo Brown R extra, G

Browns: Direct Fast Brown B
Pluto Brown NB, GG, R
Pluto Orange G
Toluylene Orange G, R

Blacks: Benzo Nitrol Black B, T
Diamine Black RO, ROO
Direct Blue Black B
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra
Pluto Black B

After-treat as follows:

a) With Benzo Nitrol Developer paste.

For 100 lbs. goods bottomed with 2 % = 2 lbs. dyestuff

3 lbs. Benzo Nitrol Developer paste

are necessary.

This quantity is worked into a smooth paste with as little cold water as possible (¼—½ pint), and is then made up with water to 3 gallons, during constant stirring, and afterwards added to the developing bath which should contain a sufficient quantity of cold water to work the goods in (about 150 gallons) and also

1½ pints commercial hydrochloric acid 34° Tw.

With occasional stirring up the bath is allowed to stand about ½ hour, and it then becomes quite clear, but before entering the bottomed material add,

12 oz. acetate of soda and 4 oz. soda ash,

each well dissolved in water, and stir up the bath well again. The bottomed material can now be entered, and work for ½ hour in the cold developing bath, then rinse well. For heavier shades than a 2 % bottom, 3—4 lbs. Benzo Nitrol Developer are required, and correspondingly larger quantities of the other ingredients.

b) Developing with Paranitraniline.

For light to medium shades (bottomed with 2 % dyestuff or less)

12 oz. Paranitraniline per 100 lbs goods

should be used, and for dark shades 1 lb.

This is stirred up with ½ gallon water into a smooth paste and then mixed with

1 quart hydrochloric acid 34° Tw.

during constant stirring.

On adding hydrochloric acid, the Paranitraniline is at first dissolved, but the hydrochloride formed soon separates out as a crystalline precipitate. Allow the solution to stand for about ½ hour, and then add 3 gallons cold water to it, after which pour in rapidly a solution of

9 oz. sodium nitrite

dissolved in 1 quart water during constant stirring.

Allow this solution to stand for ½ hour, which should then be quite clear, except for a slight scum on the surface. This can be removed by pouring the diazo solution into the developing bath through a coarse cotton cloth held over a sieve. Then make up the bath with a sufficient quantity of water to work the goods in.

Shortly before the bottomed material is entered add to the bath

12 oz. soda ash and 9 oz. acetate of soda.

This entire process is best carried out in fairly deep vessels.

Work in the cold developing bath for ½ hour, then rinse well, and if necessary soap.

c) Paranitraniline S Developer.

As a rule take half as much Paranitraniline S as the quantity of colour employed, e. g. when dyeing 100 lbs. yarn with 4% dyestuff take 2 lbs. Paranitraniline S, which are diazotised as follows:

Pour 1½ lbs. commercial hydrochloric acid 28° Tw. on 2 lbs. Paranitraniline S

and then dissolve in 3¼ pints of hot water. When this solution has cooled down pour it in a fine stream and under constant stirring into

5 gallons cold water.

Then add 8½ oz. sodium nitrite

dissolved in 4 pints water, which should also be done under constant stirring. After a short time the solution is perfectly clear, and the diazo solution is ready for use.

Add to the developing bath a clear solution of

5 3/4 oz. soda ash
17 » acetate of soda crystals

and make up with cold water to a volume of 20 : 1 of goods, to which add the diazo solution under constant stirring.

Enter the goods, work for 1/2 hour, rinse and soap slightly. A slight soaping cannot be avoided, as otherwise the goods when woven with white will bleed yellowish in the washing.

If the goods have been only slightly bottomed the quantity of Paranitraniline S can also be correspondingly decreased, but for very light shades not less than 1 % should be taken.

For those who are not thoroughly acquainted with the diazotising and developing process it is advisable to test the bath thus prepared with a strip of Congo paper, which should not turn bluish in the slightest, as otherwise, should for instance the quantity of hydrochloric acid be stronger than that given in the recipe, then it is absolutely necessary to add some acetate of soda until Congo paper reacts quite neutral in order to obtain shades perfectly fast to washing.

When employing Benzo Nitrol Developer in paste take for light to medium shades for 100 lbs. or 100 kilos goods:

For 100 lbs.		For 100 kilos
3 lbs.	or	3000 grms. Benzo Nitrol Developer paste
1 1/2 pints	»	1000 ccm. hydrochloric acid 34° Tw.
6 1/2 oz.	»	400 grms. acetate of soda
10 oz.	»	620 grms. soda ash

For Dark shades (dyed with more than 2 % colour).

4 lbs.	or	4000 grms. Benzo Nitrol Developer paste
1 quart	»	2500 ccm. hydrochloric acid 34° Tw.
9 oz.	»	550 grms. acetate of soda
13 »	»	800 » soda ash

When employing Paranitraniline, take for light to medium shades (requiring up to 2 % dyestuff):

For 100 lbs.		For 100 kilos.
12 oz.	or	750 grms. Paranitraniline
1 1/2 pints	»	1900 ccm. hydrochloric acid 34° Tw.
6 1/2 oz.	»	400 grms. sodium nitrite
6 1/2 »	»	400 » acetate of soda
10 »	»	620 » soda ash

For dark shades (requiring more than 2% dyestuff).

1 lb.	or 1000 grms.	Paranitraniline	
1 quart	» 2500 ccm.	hydrochloric acid	34° Tw.
9 oz.	» 550 grms.	sodium nitrite	
9 »	» 550 »	acetate of soda	
13 »	» 800 »	soda ash.	

When using Paranitraniline diazo solution in quantities regularly, it is best to prepare same in petroleum casks holding 45—55 gallons furnished with a wooden tap at the bottom. In such casks sufficient Diazo solution can be prepared for about 8 lots of 100 lbs. each.

The solution is prepared according to the directions given above, and then made up to about 45—55 gallons. For each lot of goods of 100 lbs. 6—7 gallons should be run off. Wooden buckets, of 3 gallons capacity, which are employed in many dyehouses are also well adapted for the purpose.

The residue produced in the diazotising process floats on the surface of the liquor in the cask and only the clear liquor is drawn off through the tap. Care should be taken that the casks are stored in a cool place, so that when diazotising, the temperature of the liquor, before adding the sodium nitrite, is not higher than 60° Faht. If necessary cool down with ice to 50—60° Faht.

Remarks: An excess of nitrous acid should not be present, as such is liable to affect the proper shade, especially Blacks.

15. A list of **Benzidine colours** which are **very fast to light.**

Reds: Brilliant Geranine B, 3B
Benzo Fast Pink 2BL
Benzo Fast Red L, GL
Benzo Fast Scarlet 4BS, GS, 5BS
Geranine BB, G

Oranges: Chloramine Orange G
Mikado Orange G
Pluto Orange G
Toluylene Orange G

Yellows: Brilliant Yellow
Chloramine Yellow GG, M, HW
Chrysamine G, R, GS, RS (direct or coppered)
Chrysamine G, R, GS, RS (coppered, chromed)

Yellows: Chrysophenine, GS
Direct Yellow R, R extra
Yellow PR (chloride of lime)

Greens: Benzo Dark Green B
Benzo Olive (direct or coppered, chromed)
Brilliant Benzo Green B

Blues: Benzo Azurine G, 3G, R (coppered)
Benzo Azurine G (afterwards treated with copper and chrome)
Benzo Black Blue G, 5G, R
Benzo Blue 2B, 2R, RW (coppered)
Benzo Chrome Black B, N
Benzo Chrome Black Blue B
Benzo Cyanine 3B (coppered)
Benzo Fast Blue B, BN, R, G
Benzo Indigo Blue (direct or coppered)
Benzo Navy Blue B
Benzo Sky Blue (coppered)
Brilliant Azurine 5G
(the best clear uncoppered blue)
Brilliant Azurine 5G (coppered)
Brilliant Azurine 2R (Dev. A.) (coppered)
Brilliant Benzo Blue 6B (coppered)
Diazo Blue, 3R, (Dev. A) (coppered)
Diazo Navy Blue 3B (Dev. A) (coppered)
Diazo Indigo Blue B, M, R, BR extra (Dev. A)

Violets: Benzo Fast Violet R

Browns: Benzo Chrome Brown G, 5G, 3R (direct, or coppered, chromed)
Benzo Nitrol Brown G (Paranitraniline)
Toluylene Orange G (coppered, chromed)

Greys: Benzo Fast Black direct or (Dev. A) or (Dev. H.)

Blacks: Benzo Chrome Black B, N (coppered, chromed)
Benzo Fast Black
Benzo Fast Black (Dev. H)
Diazo Black 3B (Dev. H) (coppered)
Diazo Fast Black 3B, G (Dev. A), BHX (Dev. A) (Dev. H), SD
Diazo Fast Black 3B, G (Dev. H) (coppered)
Pluto Black G, CR, L extra

16. **Benzidine colours** which are **fast to alkali** (spotting with a **20%** solution of **ammonia**).

Reds: Benzo Fast Pink 2 BL
Benzo Fast Red L, GL
Benzo Red 10 B
Benzo Fast Scarlet 4BS, GS, 5BS, 8BS, 22 195
Benzo Nitrol Bordeaux G (Paranitraniline)
Benzo Purpurine 1 B, 4 B, 4 B conc., 6B, 10B
Benzo Rhoduline Red B, 3 B
Brilliant Congo R
Brilliant Geranine B, 3 B
Brilliant Purpurine R, 4 B
Congo Red 4 R
Congo Rubine
Delta Purpurine 5 B, 7 B
Diamine Red B, 3 B
Diazo Bordeaux (Dev. A)
Diazo Rubine B (Dev. A)
Geranine G
Hessian Purple N
Rose Azurine B, G
Yellow PR (Dev. A) (Dev. B)

Oranges: Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R
Mikado Orange G,
Toluylene Orange R
Primuline Yellow (Dev. F)

Yellows: Chloramine Yellow GG, M, HW
Chrysophenine G, GS, R
Direct Yellow R, R extra
Primuline Yellow
Primuline Yellow (Paranitraniline)

Greens: Benzo Green BB, G (fairly good)
Benzo Green BB, G (fluoride of chrome)
Chicago Blue B (Paranitraniline)

Blues: Benzo Blue 2 B, 3 B, 2 R, 4 R, RW
Benzo Blue RW (coppered)
Benzo Cyanine B, 3 B
Benzo Cyanine 3 B (coppered)
Benzo Fast Blue B, BN, R, 5 R, G
Benzo Navy Blue B

Blues: Benzo Sky Blue, conc., 4B
Benzo Red Blue G, R
Brilliant Azurine 2R, 5R
Brilliant Benzo Blue 6B, 6BS
Brilliant Benzo Blue 6B, 6BS (coppered)
Chicago Blue B, R
Diazo Black B, BHN
Diazo Blue, 3R (Dev. A)
Diazo Blue Black
Diazo Navy Blue 3B (Dev. A)
Diazo Navy Blue 3B (Dev. A) (coppered)
Diazo Indigo Blue B, BR extra, M, R, 3R (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazurine B (Dev. A)

Violets: Benzo Fast Violet R
Benzo Violet RL extra
Chloramine Violet R

Browns: Benzo Brown B, G, 5R, BR, GG, D, RC, 3G extra (fairly good)
Benzo Chrome Brown B, R (fairly good) BS, 3R, CR
Benzo Chrome Brown B, BS, CR, R, 3R (coppered, chromed)
Benzo Nitrol Brown G, RO, 2R (Paranitraniline)
Diazo Brown G (direct or Dev. H)
Diazo Brown R extra (diazotised and developed with soda)
Diazo Brilliant Black B, R (diazotised and developed with soda)
Direct Bronze Brown
Direct Fast Brown B, GG
Direct Deep Black E, RW (coppered, chromed)
Pluto Brown R
Toluylene Brown B, BBO, M, R

Greys: Benzo Fast Grey
Benzo Fast Black
Pluto Black G

Blacks: Benzo Chrome Black B, N (coppered, chromed)
Benzo Fast Black
Benzo Nitrol Black B, T (Paranitraniline)
Benzo Black

Blacks: Diamine Black RO
Diazethyl Black B, R (Dev. B)
Diazo Blue Black (Dev. A)
Diazo Brilliant Black B, R (Dev. A) (Dev. B)
Diazo Fast Black 3B, G, BZ, BHX (Dev. A) (Dev. H), S D (Dev. A) (Dev. F) (Dev. H); B (Dev. H) (fairly good)
Diazo Black B, 2B, 3B, R, R extra, BHN (Dev. A) (Dev. H)
Direct Blue Black B, 2B, N
Direct Black VT
Direct Deep Black E, E extra, G, R, T
Pluto Black A, A extra, B. BS extra. 3B extra, CR, FR, F extra, G, L extra, R

17. **Benzidine colours** which are **fast to acetic acid** 9° Tw. (fast to perspiration).

Reds: Benzo Fast Red L, G L
Benzo Fast Scarlet 4BS, 5BS, 8BS, GS, 22.195
Benzo Nitrol Bordeaux G (Paranitraniline)
Benzo Purpurine 1B (fairly good)
Benzo Rhoduline Red B, 3B
Benzo Red SG
Brilliant Congo R (fairly good)
Brilliant Geranine B, 3B
Delta Purpurine 5B, 7B (fairly good)
Diamine Red B, 3B (fairly good)
Diazo Bordeaux (Dev. A)
Geranine BB, G
Rose Azurine B, G
Trona Red 3B, 7B, GG
Yellow PR (Dev. A) (Dev. B)

Oranges: Benzo Fast Orange S
Chloramine Orange G (fairly good)
Congo Orange G, R
Mikado Orange G
Pluto Orange G
Toluylene Orange G

Yellows: Brilliant Yellow
Chloramine Yellow M, GG, HW
Chrysamine G, GS, R, RS
Chrysophenine G, GS, R
Curcumine S

Yellows: Direct Yellow R, R extra
Primuline Yellow (D. J)
Primuline Yellow (Paranitraniline)

Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Benzo Green BB, G (fluoride of chrome)
Benzo Olive (almost good)
Brilliant Benzo Green B
Chicago Blue B, (Paranitraniline)

Blues: Azo Blue
Benzo Azurine G, 3G, R, 5R
Benzo Azurine G, 3G (coppered)
Benzo Azurine G (coppered, chromed)
Benzo Blue RW, BX, 2B, 3B, 2R, 4R
Benzo Blue RW (coppered)
Benzo Chrome Black B, N
Benzo Chrome Black Blue B
Benzo Cyanine B, 3B, R
Benzo Cyanine 3B (coppered)
Benzo Fast Blue B, BN, G, R, 5R
Benzo Indigo Blue
Benzo Indigo Blue (coppered)
Benzo Navy Blue B
Benzo Sky Blue, conc., 4B
Benzo Red Blue G, R
Benzo Black Blue G, 5G, R
Brilliant Azurine B, 5G
Brilliant Azurine 5G (coppered)
Brilliant Benzo Blue 6B, 6BS
Brilliant Benzo Blue 6B, 6BS (coppered)
Chicago Blue B
Congo Blue 2B
Diazo Blue, 3R (Dev. A)
Diazo Blue, 3R (Dev. A) (coppered)
Diazo Blue Black
Diazo Navy Blue 3B (Dev. A)
Diazo Navy Blue 3B (Dev. A) (coppered)
Diazo Indigo Blue B, M, R (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazo Black B, BHN
Diazo Black R, R extra (almost good)
Diazurine B (Dev. A)

Violets: Azo Violet (coppered)
Benzo Bordeaux 6 B
Benzo Fast Violet R
Benzo Violet R, R L extra
Chloramine Violet R
Congo Corinth B
Heliotrope B B

Browns: Benzo Brown B, B R, B X, G, 2 G, N B R, N B X, 5 R
Benzo Chrome Brown B S
Benzo Chrome Brown B, 3 R (coppered, chromed)
Benzo Nitrol Brown G, 2 R, R O (Paranitraniline)
Diazo Brown G
Diazo Brown G, R extra (Dev. A) (Dev. H)
Direct Bronze Brown
Direct Fast Brown B, G G
Direct Fast Brown B (Dev. A) (Dev. H)
Direct Deep Black E, R W (coppered, chromed)
Pluto Brown R, N B, 2 G
Toluylene Brown B, R, M, B B O

Greys: Benzo Fast Grey (almost good)
Benzo Fast Black
Diazo Blue Black (Dev. A) (Dev. H)
Direct Blue Black B, 2 B, N
Direct Black V T
Direct Deep Black R
Pluto Black B, G, R

Blacks: Benzo Chrome Black B, N (coppered, chromed)
Benzo Fast Black
Benzo Nitrol Black B, T (Paranitraniline)
Benzo Black, S extra
Diazethyl Black B, R (Dev. B)
Diazo Brilliant Black B, R (Dev. A) (Dev. B) (Dev. H)
Diazo Fast Black 3 B, G, B Z (Dev. A) (Dev. H), B H X (direct) (Dev. A and Dev. H)
Diazo Black B, 3 B, R, R extra, B H X, G, H (Dev. A) (Dev. H)
Diazo Black 3 B (Dev. A) (coppered)
Direct Blue Black B, N, 2 B

Blacks: Direct Deep Black R
Direct Deep Black E, RW (Dev. A) (Dev. H)
Pluto Black A, A extra, B, BS extra, 3 B extra, FR, G, R, CR, F extra, F extra conc., L extra
Pluto Black B (Paranitraniline)

18. **Benzidine colours** which are **fast to diluted mineral acids** (e. g. cold hydrochloric acid 4.4° Tw.)

Reds: Benzo Fast Scarlet 4BS, GS
Benzo Red SG
Brilliant Geranine B
Diazo Bordeaux (Dev. A)
Geranine BB, G
Trona Red 3 B, 7 B, GG
Yellow PR (Dev. A)
Oranges: Mikado Orange G
Yellows: Chloramine Yellow M, GG, HW
Direct Yellow R, R extra
Greens: Benzo Olive
Chicago Blue B, (Paranitraniline)
Blues: Azo Blue
Benzo Azurine G, 3 G, R
Benzo Azurine G, 3 G (coppered)
Benzo Blue RW
Benzo Chrome Black B, N
Benzo Chrome Black Blue B
Benzo Cyanine B, 3 B, R
Benzo Fast Blue B, BN
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Sky Blue, conc.,
Benzo Black Blue G, 5 G, R
Brilliant Azurine B, 5 G
Brilliant Azurine 5 G (coppered)
Brilliant Benzo Blue 6 B, 6 BS
Chicago Blue B
Congo Blue 2 B
Diazo Blue Black
Diazo Navy Blue 3 B (Dev. A)
Diazo Indigo Blue B, M (Dev. A)
Violets: Benzo Bordeaux 6 B

Browns: Benzo Nitrol Brown G, RO, 2R (Paranitr.)
Cotton Brown I, II, III
Diazo Brown G
Diazo Brown G, (Dev. A) (Dev. H)
Direct Fast Brown B, GG
Direct Fast Brown B (Paranitraniline)
Direct Deep Black E, RW (coppered, chromed)
Pluto Brown R

Greys: Benzo Fast Black
Pluto Black B

Blacks: Benzo Chrome Black B (coppered, chromed)
Benzo Chrome Black Blue B (coppered, chromed)
Benzo Fast Black
Benzo Fast Black (Dev. H)
Benzo Nitrol Black B, T (Paranitraniline)
Diazethyl Black B, R (Dev. B)
Diazo Brilliant Black B, R (Dev. A) (Dev. B)
Diazo Black B, G, 3B, BHN (Dev. A)
Diazo Black 3B (Dev. A) (coppered)
Pluto Black B, BS extra, 3B extra, G, R, CR

19. **Benzidine colours** which are **fast to chlorine** (solution of chloride of lime 0.7° Tw. for 5 mins.)
(Those products marked with an asterisk are especially fast to chlorine).

Reds: Benzo Rhoduline Red B, 3B (moderately)
Brilliant Geranine B, 3B (moderately)
Diazo Bordeaux (Dev. A)
Geranine BB, G (moderately)
Primuline Yellow (Dev. A)

Oranges: *Chloramine Orange G
Congo Orange G, R
*Mikado Orange G

Yellows: *Chloramine Yellow GG, M, HW
*Chrysophenine, GS
*Direct Yellow R, R extra
*Primuline Yellow (chloride of lime)

Violets: Chloramine Violet R

20. **Benzidine colours** which are **fast to ironing** (i. e. the shades of which are unaffected by heat).

Reds: Benzo Purpurine 1B, 4B, 6B, 10B (fairly good)
Benzo Fast Pink 2BL

Reds: Benzo Red S G
Brilliant Purpurine R (fairly good)
Congo Red
Congo Rubine
Delta Purpurine 5 B, 7 B (fairly good)
Diamine Red B, 3 B (fairly good)
Diazo Bordeaux (Dev. A)
Geranine G (fairly good)
Hessian Purple B, N (fairly good)
Primuline Yellow (Dev. A) (Dev. B)
Rose Azurine B, G (fairly good)

Oranges: Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Orange T A
Pluto Orange G
Primuline Yellow (Dev. F)
Toluylene Orange G

Yellows: Brilliant Yellow
Chloramine Yellow G G, M
Chrysamine G, R
Chrysophenine G S
Curcumine S
Direct Yellow R, R extra
Primuline Yellow
Primuline Yellow (Dev. J)

Greens: Benzo Dark Green B, G G
Benzo Green B B, G
Benzo Green B B, G (fluoride of chrome)
Benzo Olive
Chicago Blue B (Paranitraniline)

Blues: Benzo Azurine G (coppered, chromed)
Benzo Blue 2 B, 3 B, R W, 4 R
Benzo Blue R W (coppered)
Benzo Chrome Black B, N
Benzo Chrome Black Blue B
Benzo Cyanine B, 3 B
Benzo Fast Blue R
Benzo Indigo Blue (direct or coppered)
Benzo Navy Blue B
Benzo Red Blue G, R
Benzo Sky Blue, conc., 4 B

Blues: Benzo Sky Blue (coppered)
Benzo Black Blue G (fairly good), 5 G
Brilliant Azurine 5 G (direct or coppered)
Brilliant Benzo Blue 6 B, 6 BS (direct or coppered)
Chicago Blue B (fairly good), R
Congo Blue 2 B
Diazo Blue Black
Diazo Navy Blue 3 B (Dev. A)
Diazo Navy Blue 3 B (Dev. A) (coppered)
Diazo Indigo Blue B, M, R (Dev. A)
Diazo Indigo Blue B (Dev. A) (coppered)
Diazo Red Blue 3 R (Dev. A)
Diazo Black B, R, R extra, BHX, 3 B

Violets: Chloramine Violet R

Browns: Benzo Brown B, BR, BX, G, GG, R extra, 5 R
Benzo Chrome Brown B, CR, G, 5 G, R, 3 R,
Benzo Chrome Brown B, CR, G, 5 G, R, 3 R (coppered, chromed)
Benzo Nitrol Brown G, 2 R, RO (Paranitraniline)
Cotton Brown I, II, III, IV
Diazo Brown R extra (diazotised and developed with soda)
Diazo Brown G
Diazo Brown G, (Dev. A)
Diazo Brilliant Black B, R (diazotised and developed with soda)
Direct Bronze Brown
Direct Fast Brown B, GG
Direct Deep Black E, RW (coppered, chromed)
New Toluylene Brown B, BBO, M
Pluto Brown GG, NB

Greys: Benzo Fast Grey
Benzo Fast Black

Blacks: Benzo Chrome Black, B, G, N (coppered, chromed)
Benzo Fast Black
Benzo Fast Black (Dev. A) (Dev. H)
Benzo Nitrol Black B (Paranitraniline)
Diazethyl Black R (Dev. B)
Diazo Blue Black (Dev. A) (Dev. H)

Blacks: Diazo Brilliant Black B, R (Dev. A) (Dev. B)
Diazo Fast Black 3B, G, BZ, (Dev. A) (Dev. H), SD
Diazo Black B, 3B, BHN, G, R, R extra (Dev. A)
Diazo Black B, 3B, BHN, G, H, R extra (Dev. H)
Direct Blue Black B, 2B, N
Direct Deep Black E, E extra, G, R, RW, T
Pluto Black A, A extra, B, BS extra, 3B extra, FR, F extra, G, R

21. **Benzidine colours** which **resist hot ironing on a damp cloth:**

Reds: Benzo Fast Pink 2BL (fairly good)
Benzo Rhoduline Red B
Congo Red (fairly good)
Diazo Bordeaux (Dev. A.)
Diazo Rubine B (Dev. A)
Primuline Yellow (Dev. A) Dev. B)
Trona Red 3B, 7B

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Mikado Orange G,
New Toluylene Orange G
Pluto Orange G
Toluylene Orange G

Yellows: Chloramine Yellow GG, M, HW
Chrysamine G, R
Chrysophenine (fairly good)
Curcumine S
Direct Yellow R, R extra
Primuline Yellow
Thiazole Yellow G

Greens: Benzo Green BB, G (rather good)
Brilliant Benzo Green B

Blues: Benzo Azurine G
Benzo Blue 2B, 3B, 2R, 4R, RW
Benzo Chrome Black B
Benzo Chrome Black Blue B (direct or coppered, chromed)

Blues: Benzo Cyanine B, 3B
Benzo Fast Blue B
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Sky Blue 4B (almost good)
Benzo Red Blue G, R
Benzo Black Blue G
Brilliant Azurine B, 5G
Chicago Blue 4B and R (fairly good)
Diazo Blue (Dev. A)
Diazo Navy Blue 3B (Dev. A)
Diazo Indigo Blue B, M, R, (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazurine B (Dev. A)

Violets: Benzo Violet R

Browns: Benzo Brown RC, D3G extra
Benzo Chrome Brown B, CR, 5G, R, 3R (coppered, chromed)
Benzo Nitrol Brown G, RO, 2R, (Paranitr.)

Greys: Benzo Fast Grey (fairly good)
Benzo Fast Black
Benzo Grey (fairly good)
Benzo Grey S extra (fairly good)

Blacks: Benzo Chrome Black B, N (coppered, chromed)
Benzo Fast Black
Benzo Fast Black (Dev. A)
Benzo Black, S extra
Benzo Nitrol Black B, T (Paranitraniline)
Diazethyl Black R, B (Dev. B)
Diazo Blue Black (Dev. A)
Diazo Brilliant Black B, R (Dev. A) (Dev. B)
Diazo Fast Black 3B, G, BZ (Dev. H)
BHX (direct), BHX, SD (Dev. A) (Dev. H)
Diazo Black B, 2B, 3B, BHN (Dev. A)
Diazo Black G, H, R extra, (Dev. A)
Direct Blue Black 2B, N
Pluto Black A, A extra, B, FR, G, R, BS extra, CR (chrome), F extra, L extra
Pluto Black B (Paranitraniline).

22. **Benzidine colours** the **shades** of which when dyed on cotton are more or less **fast to stoving:** The dyestuffs in **brackets** are changed more or less when stoved, but the original shade returns when rinsed in water.)

Reds: (Benzo Purpurine 1B, 4B, 6B, 10B)
Benzo Red SG, 10B
Benzo Fast Scarlet 4BS, 5BS, 8BS, GS
Benzo Fast Red L, GL
Benzo Fast Pink 2BL
(Brilliant Congo R)
Brilliant Geranine B, 3B
(Congo Red)
(Delta Purpurine 5B, 7B)
(Diamine Red B, 3B)
Diazo Bordeaux (Dev. A)
Diazo Rubine B (Dev. A)
Geranine BB G
(Hessian Purple N)
Primuline Yellow (Dev. A) (Dev. B)
Rose Azurine B
Trona Red 3B, 7B, GG

Oranges: Benzo Fast Orange S
(Benzo Orange R)
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Pluto Orange G
Toluylene Orange G

Yellows: Chloramine Yellow GG, M, HW
Chrysamine G, R, GS, RS
Chrysophenine, GS
Curcumine S
Direct Yellow R, R extra
Primuline Yellow (Dev. J)
Thiazole Yellow G, R

Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B

Blues: Azo Blue
Benzo Azurine G, 3G, R

Blues: Benzo Blue 2B, 3B, BX, 2R, 4R
Benzo Chrome Black N
Benzo Cyanine B, 3B, R
Benzo Fast Blue G, BN, R, 5R
Benzo Sky Blue, 4B
Benzo Red Blue G, R
Brilliant Azurine B, 5G, 2R, 5R
Brilliant Benzo Blue 6B, 6BS
Chicago Blue B, R
Congo Blue 2B
Diazo Blue (Dev. A)
Diazo Indigo Blue B, BR extra, M, R (Dev. A)
Diazurine B (Dev. A)

Violets: Azo Violet
Benzo Bordeaux 6B
Benzo Violet R, RL extra
Chloramine Violet R
Congo Corinth B, G
Benzo Brown RC

Browns: Benzo Chrome Brown G, 5G, R
Benzo Nitrol Brown RO, 2R, O (Paranitraniline)
Diazo Brown G, R extra
Diazo Brown R extra (Dev. A) (Dev. H)
Diazo Brown R extra (diazotised and developed with soda)
Diazo Brilliant Black B, R (diazotised and developed with soda)
Direct Fast Brown B
Pluto Brown R
Primuline Yellow (Dev. G) (Dev. F)

Greys: Benzo Fast Grey
Benzo Grey S extra

Blacks: Benzo Chrome Black B (coppered, chromed)
Benzo Fast Black
Benzo Nitrol Black B (Paranitraniline)
Benzo Black, S extra
Diamine Black RO
Diazo Brilliant Black B (Dev. A), R (Dev. H)
Diazo Black B, 2B, 3B, BHN, BHN extra, G, H, R, R extra, (Dev. A)
Diazo Fast Black BHX, SD (Dev. H) (Dev. A)

Blacks: Direct Blue Black B, 2B, N
Direct Black V T
Direct Deep Black E, E extra, EW, EW extra, R W, R W extra, R, G, T
Pluto Black A, A extra, B, G, R, FR, BS extra, F extra, C R, T G extra, T G extra conc.

23. **Benzidine colours** the dyed shades of which are **dischargeable** with **acetate** of **tin** (possibly with an addition of tin crystals.)

Reds: Benzo Fast Scarlet 4BS, 5BS, GS, 8BS 22195 (sulphocyanide of tin)
Benzo Fast Pink 2BL (moderately good)
Benzo Fast Red GL (sulphocyanide of tin)
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Red 10B
Benzo Rhoduline Red B
Brilliant Congo R
Brilliant Geranine B (yellowish), 3B (good)
Brilliant Purpurine R, 4B
Congo Red, 4R
Congo Rubine
Delta Purpurine 5B, 7B
Diamine Red B, 3B
Diazo Rubine B (Dev. A) (sulphocyanide of tin)
Geranine BB, G
Hessian Purple N (yellowish)
Rose Azurine B, G
Trona Red 3B, GG, 7B (cream)

Oranges: Benzo Orange R
Chloramine Orange G,
Congo Orange G, R
Orange T A
Pluto Orange G
Toluylene Orange G (moderately), R (good)

Yellows: Brilliant Yellow
Chrysophenine, G S

Greens: Benzo Dark Green B, G G
Benzo Green B B, G
Benzo Olive (rather good)

Blues: Azo Blue
Benzo Azurine G, 3G, R
Benzo Azurine G, 3G (coppered)

Blues: Benzo Azurin G (coppered, chromed)
Benzo Blue 2B, 3B, BX, 2R, 4R, RW
Benzo Blue RW (coppered)
Benzo Chrome Black B, N
Benzo Chrome Black Blue B
Benzo Copper Blue B
Benzo Cyanine B, 3B, R
Benzo Cyanine 3B (coppered)
Benzo Fast Blue B, BN, R, G, 5R
Benzo Indigo Blue (rather good)
Benzo Indigo Blue (coppered)
Benzo Navy Blue B (rather good)
Benzo Sky Blue, conc., 4B
Benzo Sky Blue (coppered)
Benzo Red Blue G, R
Benzo Black Blue G, 5G, R
Brilliant Azurine B, 5G
Brilliant Benzo Blue 6B, 6BS
Brilliant Benzo Blue 6B (coppered)
Chicago Blue B, R
Congo Blue 2B
Diazo Blue (Dev. A) (rather good)
Diazo Blue 3R (Dev. A)
Diazo Blue 3R (Dev. A) (coppered)
Diazo Blue Black (undiazotised)
Diazo Navy Blue 3B (Dev. A)
Diazo Navy Blue 3B (Dev. A) (coppered)
Diazo Indigo Blue B, M, R, B R ex. (Dev. A)
Diazo Indigo Blue R (Dev. A) (coppered)
Diazo Red Blue 3R (Dev. A)
Diazo Black B, 3B, BHN, R, R extra
Diazurine B (Dev. A)

Violets: Azo Violet
Benzo Bordeaux 6B
Benzo Fast Violet R (only fairly good)
Benzo Violet R, RL extra
Chloramine Violet R (cream)
Congo Corinth B, G
Heliotrope BB

Browns: Benzo Brown B, BR, BX, G, GG, NB, NBR, NBX, R extra; RC (cream)
D3G ex. (cream)

Browns: Benzo Chrome Brown B, BS, CR, G 5G, R, 3R
Benzo Chrome Brown B, BS, CR, G, 5G, R, 3R (coppered, chromed)
Benzo Dark Brown
Benzo Nitrol Brown G, 2R (Paranitraniline)
Cotton Brown I, II, III, IV (moderately)
Diazo Brown G (yellowish)
Diazo Brown R extra
Diazo Brown R extra (Dev. A) (Dev. H) (reddish)
Diazo Brown R extra (diazotised and developed with soda)
Direct Bronze Brown
Direct Fast Brown B, GG
New Toluylene Brown B, BBO, M
Pluto Brown R, GG, NB
Pluto Orange G (Paranitraniline) fairl well

Greys: Benzo Chrome Black B, N (yellowisyh)
Benzo Fast Black
Benzo Fast Grey (yellowish)
Benzo Grey, S extra
Diazo Black BHN
Diazo Fast Black BHX
Direct Blue Black B
Pluto Black B, G, R, CR

Blacks: Benzo Fast Black
Benzo Fast Black (Dev. H)
Benzo Nitrol Black B, T (Paranitraniline)
Benzo Black, S extra
Diazethyl Black R (Dev. B)
Diazo Blue Black (Dev. A)
Diazo Brilliant Black B, R (Dev. A) (Dev. H)
Diazo Fast Black 3B, G, BZ (Dev. A) (Dev. H), BHX, SD (direct) (good), SD, (Dev. H or Dev. A) (reddish cream)
Diazo Black B, 2B, 3B, BHN, BHN extra, R, R extra (Dev. A) (yellowish)
Direct Blue Black B, N, 2B
Direct Deep Black E, E extra, EW, EW extra, G, R, RW, RW extra, T (yellowish)

Blacks: Pluto Black A, B, 3 B extra, BS extra, FR, G, R, CR, (yellowish), F extra, L extra, A extra (fairly good) JF extra concen., TG extra, TG extra concen. (almost good)

General Recipes for discharging Benzidine colours White with Stannous Oxide salts.

a) For piece goods.

White Discharge I (with acetate of tin).

Boil: 4[5]/[8] gallons	or 870 grms.	**acetate of tin** 32° Tw.	
7 lbs.	» 110 »	wheat starch and	
1 pint	» 20 »	acetic acid 9° Tw. (30 %)	
	1000 grms.		

White Discharge II

Boil: 8[1]/[2] lbs.	or 138 grms.	wheat starch	
1[1]/[2] galls.	» 277 »	**acetate of tin** 32° Tw.	
7[1]/[2] pints	» 170 »	gum water 1 : 1 and	
1[3]/[4] galls.	» 277 »	water, then add	
7 lbs.	» 111 »	**tin crystals** and whilst still luke warm, add	
1[3]/[4] lbs.	» 27 »	citric acid powder	
	1000 grms.		

Dye the **bleached** cotton pieces with Benzidine colours (on unbleached pieces less colour can be taken, but the discharge effects are not so good), then dry, print on the white discharge, steam for 5—10 mins. (or pass once or several times through the Mather & Platt), wash, (if necessary acidulate slightly) and dry. The lighter a Benzidine colour is dyed the easier it is to discharge a pure white, the darker the shade the more difficult it is to discharge. The discharge paste has to be correspondingly reduced according to the depth of shade, design or respective colour employed. The greater the quantity of tin crystals contained in the discharge paste the shorter the pieces have to be steamed, so that the cotton does not become deteriorated. The longer the discharged goods are steamed the yellower the white discharge becomes.

Glycerine, acetine, a trace of Methylene Blue, Alkali Blue, Prussian Blue, etc. are sometimes added to the white discharge paste; the blue colour is added as the discharges are liable in course of time to become yellowish.

Shades developed and after-treated with metallic salts cannot be discharged so easily white as merely direct dyed shades.

Discharge White III is very useful for some colours, as the discharges do not turn yellowish so easily when steamed or stored.

White Discharge III.

F.

Boil: 2¾ lbs.	or 90 grms.		wheat starch
2¼ galls.	» 720 .	»	water
8¼ lbs.	» 270	»	white dextrine and
9 lbs. 6 oz.	» 300	»	yellow prussiate of potash, then allow to cool down.

Z.

Warm up:			
18¾ lbs.	or 600 grms.		tin crystals in
2⅛ galls.	» 750	»	gum water 1 : 1, and then add
2¼ lbs.	» 72	»	powdered tartaric acid

When cold, stir F into Z.

Steam for 5 minutes without pressure, then wash and dry.

White Discharge IV.

Mix cold:			
18¾ lbs.	or 604 grms.		starch tragacanth thickening
7½ »	» 237.6	»	tin crystals
6¼ »	» 99.0	»	sulphocyanide of ammonia
1⅛ pint	» 49.5	»	citric acid solution 36° Tw.
¼ »	» 9.9 ccm.		2 /₂% solution of Alkali Blue 4B
	1000 grms.		

Steam for about 4 minutes without pressure, wash, if necessary soap cold for 2 minutes, wash and dry. Steam with care, as the discharged figures easily swell. This discharge is especially useful for shades after-chromed, coppered or treated with Benzo Nitrol.

White Discharge V.

Boil: 1⅛ pints	or 304 grms.		water
10 oz.	» 99	»	wheat starch and
18 »	» 183	»	dextrine, then add
2⅛ »	» 26	»	citric acid,
27½ »	» 274	»	tin crystals and
11½ »	» 114	»	acetate of soda.
	1000 grms.		

The method of working is the same as above.

b) **for yarn.**

Boil: 5 oz. or 50 grms. wheat starch
2¼ pints » 120 » water
1 lb. 14 oz. » 300 » acetate of tin 32° Tw.
9/10 pint » 180 » gum water 1 : 1 and
2 oz. » 20 » tin crystals, then add cold
3 » » 30 » citric acid.

The dry yarn dyed with dischargeable Benzidine colours is discharged with the above »white discharge«, dried, and then steamed for 2—5 mins. without pressure, washed and dried.

24. **Benzidine colours** which are **not dischargeable,** or at least **not white,** with **acetate of tin:**

Reds: Benzo Rhoduline Red 3 B
Benzo Red SG (yellow)
Diazo Bordeaux (Dev. A)
Primuline Yellow (Dev. A) (Dev. B) (yellow)
Yellows: Chloramine Yellow GG, M, HW
Curcumine S
Direct Yellow R, R extra
Primuline Yellow superfine
Thiazole Yellow G, R
Greens: Brilliant Benzo Green B
Blues: Brilliant Azurine 2 R, 5 R
Browns: Benzo Brown 5 R (yellow)
Benzo Nitrol Brown RO (Paranitraniline) (yellowish)
Toluylene Orange R (Paranitraniline)
Blacks: Benzo Chrome Black B, N, (after-chromed) (reddish brown)
Diazo Black H (turns yellow)

25. The following **undischargeable** dyestuffs can be employed together with **tin** for **colour** discharging **dischargeable Benzidine** colours:

Reds: Alizarine Red (Alumina)
Brilliant Rhoduline Red BP (tannic acid)
Pyronine G (tannic acid)
Rhodamine B, G, S (tannic acid)
Rhoduline Red B, G, GP paste (tannic acid)
Saffranine A, B extra, BB extra, FF extra (tannic acid)
Oranges: Coriphosphine O, OX, OX extra

Oranges: Phosphine (tannic acid)
Yellows: Auramine O, I, II, conc. (tannic acid)
Greens: Brilliant Green Cryst. (tannic acid)
China Green (tannic acid)
Cotton Green (tannic acid)
Emerald Green (tannic acid)
Blues: Blue 8336 (Navy Blue) tannic acid)
Chrome Blue paste (chrome)
Celestine Blue B (chrome)
Gallamine Blue paste (chrome)
Gallocyanine (chrome)
Methylene Blue BB (tannic acid)
New Victoria Blue B (tannic acid) or (chrome)
Victoria Blue B (tannic acid) or (chrome)
Violets: Methyl Violet 1 B—7 B, 1 R—5 R (tannic acid)
Rhoduline Violet (tannic acid)
Rhoduline Heliotrope B (tannic acid)

General recipe for colour discharging Benzidine dyestuffs with Basic colours in conjunction with stannous oxide salts.

a) **For Piece goods.**

Boil:			
1—3 oz.	or	10—30 grms.	**Basic colour**
7 1/2 »	»	75 »	wheat starch
1 pint	»	200 »	acetic acid 9° Tw. (30%)
1/2—0 »	»	100—0 »	water and
1 1/2 »	»	270 »	gum water 1 : 1, then add
1 oz.—1 1/2 lbs.	»	10—250 »	acetate of tin 32° Tw.
3 » — 1/2 oz.	»	30—5 »	tin crystals, and when cold add
1/2—1 1/2 pints		60—150 »	acetic acid tannic acid solution 1 : 1
2 oz.		20 »	citric acid powder
		1000 grms.	

Steam for 10 minutes without pressure (if necessary in the Mather & Platt) pass through a cold tartar emetic bath (1 lb. per 10 gallons water) wash and dry.

b) **For yarn.**

Dissolve:

3	oz. or	30 grms.	**Basic colour** in
1 1/2	pint »	290 »	water and
1 1/2	» »	300 »	acetic acid 9° Tw. (30%) thicken with
1/2	» »	100 »	mucilage of tragacanth 65 : 1000 then add
10	oz. »	100 »	acetate of tin 32° Tw. and
1 3/4	pint »	180 »	acetic acid tannic acid solution 1 : 1
		1000 grms.	

Steam for 2—5 mins. without pressure, run through a cold tartar emetic bath, wash and dry.

26. **Benzidine colours** which are **dischargeable with zinc powder:**

Reds: Benzo Fast Red L, GL
Benzo Fast Pink 2 BL
Benzo Fast Scarlet 4BS, 5BS, 8BS, GS (yellowish), 22195
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Red 10B
Benzo Rhoduline Red B, 3B
Brilliant Congo G, R
Brilliant Geranine B, 3B
Brilliant Purpurine 4B, R
Congo Red, 4R
Congo Rubine
Delta Purpurine 5B, 7B
Diazo Rubine B (Dev. A)
Diamine Red B, 3B
Geranine BB, G
Hessian Purple B, N
Rose Azurine B, G
Trona Red 3B, 7B, GG

Oranges: Benzo Orange R
Benzo Fast Orange S
Chloramine Orange G
Congo Orange G (middling), R
Mikado Orange G
Orange TA
Pluto Orange G
Toluylene Orange G, R

Yellows: Brilliant Yellow
Chloramine Yellow GG
Chrysamine G, GS, R, RS
Chrysophenine, GS
Curcumine S
Direct Yellow R and R extra (rather good)

Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Benzo Olive (fairly good)
Brilliant Benzo Green B

Blues: Azo Blue
Benzo Azurine G, 3G, R
Benzo Azurine G, 3G, R (coppered)
Benzo Blue BX, 2B, 3B, RW, 2R, 4R
Benzo Blue RW (coppered)
Benzo Chrome Black B, N
Benzo Chrome Black Blue B
Benzo Copper Blue B
Benzo Cyanine B, 3B, R
Benzo Fast Blue B, BX, G, R, 5R
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Sky Blue, concentrated, 4B
Benzo Red Blue G, R
Benzo Black Blue G, 5G, R
Brilliant Azurine B, 5G, 2R, 5R
Brilliant Benzo Blue 6B, 6BS
Brilliant Benzo Blue 6B, 6BS (coppered)
Brilliant Sulphon Azurine R (slightly reddish)
Chicago Blue B, R
Congo Blue 2B
Diazo Blue, 3R (Dev. A)
Diazo Blue Black (undiazotised)
Diazo Navy Blue 3B (Dev. A)
Diazo Indigo Blue B, M, R, BR extra (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazo Black B, 3B, BHX, R, R extra (undiazotised)
Diazurine B (Dev. A)

Violets: Azo Violet
Benzo Bordeaux 6B
Benzo Fast Violet R (fairly good)

Violets: Benzo Violet R, RL extra
Chloramine Violet R (cream)
Congo Corinth B, G
Heliotrope BB

Browns: Benzo Brown B, BR, BX, G, GG, NB, NBR, NBX, R extra
Benzo Chrome Brown B, BS, CR, G, 5G, R, 3R
Benzo Chrome Brown B, CR, G, R, 3R, 5G, BS (coppered, chromed)
Benzo Dark Brown
Benzo Nitrol Brown G, O, 2R (Paranitraniline)
Cotton Brown I, II, III, IV
Diazo Brown G, R extra
Diazo Brilliant Black B (diazotised and developed with soda)
Direct Bronze Brown
Direct Fast Brown B, GG
New Toluylene Brown B, BBO, M
Pluto Brown GG, NB, R
Pluto Orange G (Paranitraniline)
Toluylene Orange R (Paranitraniline)

Greys: Benzo Chrome Black N
Benzo Fast Grey (yellow)
Benzo Grey
Benzo Grey S extra
Diazo Black BHN
Pluto Black B, G, R

Blacks: Benzo Fast Black
Benzo Fast Black (Dev. H)
Benzo Nitrol Black B, T (Paranitraniline)
Benzo Black, S extra
Diazethyl Black R (Dev. B)
Diazo Blue Black (Dev. A)
Diazo Brilliant Black B, R (Dev. A)
Diazo Black B, 2B, 3B, BHN, BHN extra, R, R extra (Dev. A)
Diazo Fast Black 3B, G, BZ, SD (Dev. A.) (Dev. H), BHX
Direct Blue Black B, 2B, N
Direct Deep Black E, E extra, G, R, RW, RW extra, T

Blacks: Pluto Black A, A extra, B, 3 B extra, B S extra, F R, G, R, C R, F extra, F extra concentr. L extra, T G extra, T G extra concentr. (good)

Recipe for Discharging Benzidine colours white with zinc powder.

Grind:

12 1/2 lbs.	or 333 grms.	best sieved zinc powder, and
1 1/4 gallon	» 333 »	gum water 1 : 1, cool down with ice and add
7 1/2 prints	» 334 »	sodium bisulphate 66° Tw.
	1000 grms.	

Discharge (best with a brush), steam for 1/2 — 1 hour without pressure, acidulate slightly with hydrochloric or acetic acid 1 : 100, wash and dry.

27. **Benzidine colours** which are not dischargeable, or at least **not white** with **zinc powder:**

Reds: Benzo Red S G (yellow)
Primuline Yellow (Dev. A) (yellow)
Yellows: Chloramine Yellow M, H W
Curcumine S
Primuline Yellow superfine
Thiazole Yellow G, R
Browns: Benzo Nitrol Brown R O (Paranitraniline) (yellow)
Blacks: Benzo Chrome Black B, N (coppered, chromed)

28. The following **undischargeable** dyestuffs can be employed together with **zinc powder** for **colour** discharging **dischargeable Benzidine** colours:

Reds: Brilliant Rhoduline Red B D (tannic acid)
Primuline Yellow (Dev. A)
Rhoduline Red G, G D (tannic acid)
Saffranine F F extra, F, B, B extra, B B extra (tannic acid)
Oranges: Coriphosphine O, O N, O N extra (tannic acid)
Yellows: Primuline Yellow
Blues: Methylene Blue B B (tannic acid)
Violets: Rhoduline Heliotrope B, 3 B (tannic acid)
Rhoduline Violet (tannic acid)

Recipe for Colour discharging Benzidine dyestuffs with the aid of zinc powder and undischargeable colours.

1. When employing Basic colours see recipe under No. 75.

2. When employing Primuline adopt the following recipe:

18½ oz.	or	186	grms.	Primuline
7 noggs.	»	344.8	»	water
3¼ »	»	112.4	»	dextrine
20½ oz.	»	206.8	»	zinc powder
15½ »	»	155.4	»	bisulphite of soda 52° Tw.
2 »	»	20.6	»	glycerine 48° Tw.
1⅛ »	»	13.8	»	ammonia 0.950 spec. grav
		1000	grms.	

Steam for ½ hour without pressure, acidulate slightly, wash and dry, when a yellow is obtained on a coloured bottom. A red is obtained on diazotising and developing with Beta Naphtol.

28a. **Benzidine colours** which when dyed **on cotton are dischargeable** with **Hydrosulphite NF.**

Reds: Benzo Fast Pink 2BL (as a pink good)
Benzo Fast Red GL (almost good), L (good)
Benzo Fast Scarlet GS, 4BS, 5BS, 8BS and 22195 (almost good)
Benzo Nitrol Bordeaux G (Paranitr.) (good)
Benzo Rhoduline Red B (good)
Brilliant Geranine 3B (good)
Congo Red (almost good)
Congo Rubine (almost good)
Geranine G (good)
Trona Red 3B, 7B and GG (good)

Oranges: Benzo Fast Orange S (good)
Benzo Orange R (almost good)

Yellows: Brilliant Yellow (good)
Chrysamine G (almost good) R (fairly good)
Chrysophenine G (good)

Greens: Benzo Dark Green GG (fairly good)
Benzo Green BB, C and G (good)
Benzo Olive (good)
Brilliant Benzo Green B (good)
Chicago Blue B, R (Paranitraniline) (good)

Blues: Azo Blue (good)
Benzo Azurine G (good), R (good) 3R (good)
Benzo Blue RW and 4R (fairly good), RW (coppered) (fairly good), 2B (good)
Benzo Chrome Black Blue B (good)

Blues: Benzo Fast Blue B (fairly good)
Benzo Sky Blue (fairly good)
Benzo Red Blue R (good)
Brilliant Azurine 5 G (coppered) (fairly good)
Brilliant Azurine 2 R (fairly good), B (good), 3 G (good)
Brilliant Benzo Blue 6B (good)
Brilliant Benzo Blue 6B (coppered (fairly good)
Congo Blue 2 B (good)
Diazo Navy Blue 3 B (Dev. A) (good)
Diazo Navy Blue 3 B (Dev. A) (coppered) (fairly good)
Diazo Indigo Blue B, 3 B, B R extra, M, R (good), 3 R, 2 R L and 4 R L (Dev. A) (fairly good)
Diazurine B (Dev. A) (fairly good)

Violets: Benzo Bordeaux 6 B (fairly good)
Benzo Violet R (fairly good)

Browns: Benzo Brown D 3 G extra (good)
Benzo Brown R C (fairly good) B S (fairly good)
Benzo Brown R extra, B, B X, B R, G, N B R, and N B X (Paranitr.) (good)
Benzo Chrome Brown B and R (fairly good)
Benzo Nitrol Brown 2 R (reddish) and G (Paranitr.) (good)
Diazo Brown G, R extra (Paranitr.) (good)
Direct Fast Brown B (fairly good)
Direct Fast Brown B (Paranitr.) (good)
Pluto Brown R (direct, Formaldehyde and Paranitr.) (good)

Greys: Benzo Fast Grey (slightly yellowish)
Benzo Fast Black (good)

Blacks: Benzo Fast Black (Dev. A) (good) (direct, fairly good)
Benzo Nitrol Black B and T (Paranitr.) (good)
Diamine Black R O, R O O (Paranitr.) (good)
Diamine Black R O (Dev. A) (good), R O O (fairly good)
Diazo Black B H X (Dev. A) (good)

Blacks: Diazo Fast Black BHX (direct) (good), B (Dev. A) (Dev. H), BHX (Dev. A) (Dev. H) (fairly good), (Dev. H), BZ (Dev. H), (Dev. A), (Dev. A and F), 3 B (Dev. A) SD (Dev. A), (Dev. H), (Dev. A and H), (Dev. A and F), G (Dev. H) (Dev. A) (good)
Direct Blue Black B (Paranitr.) (good)
Direct Blue Black 2 B (fairly good)
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra (Paranitr.) (good)
Direct Deep Black E, E extra, EW, EW extra, BS extra, G, RW and RW extra (fairly good)
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra (Formaldehyde) (good)
Pluto Black A, BS extra (Formaldehyde (good)
Pluto Black A, A extra, F extra conc., R (fairly good), BS extra, G (good)
Pluto Black B (Paranitr.) (good)
Pluto Black B (slightly redder)

29. **Benzidine colours** which are **dischargeable with oxidising agents:**

Reds: Benzo Fast Scarlet 4 BS (rather well) GS (reddish), 5 BS, 22195
Benzo Fast Red L (cream) GL (cream)
Benzo Fast Pink 2 BL (yellowish)
Penzo Purpurine 1 B (good)
Benzo Purpurine 4 B (yellowish)
Benzo Purpurine 6 B yellowish)
Benzo Purpurine 10 B (brown)
Benzo Rhoduline Red B, 3 B
Benzo Red SG (reddish yellow)
Brilliant Congo G (good)
Brilliant Geranine B, 3 B (good)
Brilliant Purpurine 4 B
Congo Red
Delta Purpurine 5 B (yellowish), 7 B
Diamine Red B (yellowish), 3 B
Geranine G, BB (good)
Rose Azurine G (good)
Trona Red 3 B (good)
Trona Red GG, 7 B (yellowish)

Oranges: Benzo Orange R (yellow) (moderately good)

Oranges: Congo Orange G, R (yellow)
Pluto Orange G (good)
Toluylene Orange G

Yellows: Thiazole Yellow G, R

Greens: Benzo Dark Green B (rather good)
Benzo Dark Green GG (cream)
Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B (fairly good) (slightly yellowish)

Blues: Benzo Azurine G, 3 G (good)
Benzo Blue 2 B, 3 B, B X, R W
Benzo Chrome Black Blue B
Benzo Copper Blue B (good)
Benzo Cyanine B, 3 B, R (good)
Benzo Fast Blue B, G (reddish)
R (reddish brown)
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Black Blue G, 5 G, R
Brilliant Azurine B, 5 G, 2 R, 5 R (fairly good)
Brilliant Azurine 5 G (coppered)
Brilliant Benzo Blue 6 B
Brilliant Benzo Blue 6 B (coppered)
Chicago Blue B, R
Diazo Blue, 3 R (Dev. A) (yellowish)
Diazo Blue Black (brown)
Diazo Blue Black (Dev. A) (cream)
Diazo Navy Blue 3 B (Dev. A) (cream)
Diazo Indigo Blue B, R, M (reddish)
Diazo Black 3 B, R, R extra

Violets: Azo Violet
Azo Violet (coppered)
Benzo Bordeaux 6 B (good)
Benzo Fast Violet R (reddish)
Benzo Violet R, R L extra (reddish yellow)
Chloramine Violet R (somewhat)
Congo Corinth G (good)
Heliotrope B B

Browns: Benzo Brown B, B R, B X, G, G G, N B, N B X, R extra, R C, D 3 G extra (cream)
Benzo Brown 5 R (yellow)

Browns: Benzo Chrome Brown B (brown)
Benzo Chrome Brown B (coppered, chromed) (brown)
Benzo Chrome Brown CR (reddish, cream)
Benzo Chrome Brown CR (coppered, chromed) (reddish cream)
Benzo Chrome Brown G
Benzo Chrome Brown G (coppered, chromed) (brown)
Benzo Chrome Brown 5 G (yellow)
Benzo Chrome Brown 5 G (coppered, chromed) (yellow)
Benzo Chrome Brown R
Benzo Chrome Brown R (coppered, chromed) (brownish)
Benzo Chrome Brown 3 R (reddish yellow)
Benzo Chrome Brown 3 R (coppered, chromed) (reddish yellow)
Benzo Dark Brown (yellowish)
Cotton Brown I, II, III, IV
Diazo Brown G (brown)
Diazo Brown G (Dev. A) (brown)
Diazo Brown R extra (diazotised and developed with soda)
Direct Bronze Brown (yellow)
Direct Fast Brown B
Pluto Brown GG, NB, R

Greys: Benzo Fast Grey (moderately)
Benzo Fast Black (good)
Benzo Grey S extra
Diazo Blue Black (Dev. A)
Direct Blue Black B, N
Direct Deep Black T
Pluto Black B, G, R

Blacks: Benzo Nitrol Black B (Paranitraniline) (reddish) T (reddish, cream)
Diazethyl Black B, R (Dev. B) (orange)
Diazo Blue Black (Dev. A) (brown)
Diazo Brilliant Black B, R (Dev. A) (brown)
Diazo Fast Black 3 B (Dev. A and H) (rather good)
Diazo Fast Black S D (reddish)

Blacks: Diazo Fast Black SD (Dev. H and A) (reddish)
Diazo Fast Black G, BZ (Dev. A) (reddish, cream)
Diazo Fast Black G (Dev. H) (rather good)
Diazo Black 3B (Dev. A), 2B (Dev. A) (reddish cream)
Diazo Black BHN (Dev. H) (rather good)
Diazo Black R (Dev. A) (brown)
Diazo Black R extra (Dev. A), (Dev. H) (brown)
Direct Blue Black B (Paranitraniline) (brown)
Direct Blue Black B, N (yellowish), 2B
Direct Black VT (orange yellow)
Direct Deep Black E, RW, T (cream)
Pluto Black B, G, R, FR (rather good)
Pluto Black BS extra, 3B extra and A (rather good), F extra (brownish), L extra (rather good), A extra (reddish), F extra conc. (reddish), TG extra and TG extra conc. (reddish)

Recipes for White and Colour Discharges with oxidising agents on Benzidine Colours.

White Discharges.

Discharge White O.

Boil:

3 pints	or 400 grms.		chlorate of soda solution 76° Tw.
2 lbs. 6 oz.	» 190	»	China clay
1 ¼ pint	» 120	»	water and
1 lb. 10 oz.	» 130	»	British gum, when luke warm add
4 oz.	» 20	»	red prussiate of potash powder
8 »	» 40	»	citric acid powder and
1 pint	» 100	»	water
	1000 grms.		

Colour Discharges.

Colour Discharge Recipe I.

4 ½ lbs.	or 450 grms.		**discharge lake paste** (e. g. chromate of lead paste)
4 ½ »	» 450	»	white discharge O (see above)
⅘ pint	» 100	»	albumen water 2 : 1
	1000 grms.		

Colour Discharge Recipe II.

Boil:

3 1/4 oz.	or 33 grms.	**Chrysophenine**	
1 1/4 pint	» 278 »	water	
11 1/4 oz.	» 113 »	wheat starch	
1 4/5 pint	» 371 »	mucilage of tragacanth 65 : 1000 and	
6 oz.	» 60 »	chlorate of soda, to which add when lukewarm	
7/10 »	» 7 »	red prussiate of potash powder, and when cold	
7/10 pint	» 138 »	citric acid solution 7° Tw.	
	1000 grms.		

Steam 1/4 hour without pressure, wash, if necessary, and dry.

30. **Benzidine colours** the **direct shades** of which when dyed on **cotton are relatively fast to washing** with white material:

Reds: Benzo Fast Pink 2B L
Benzo Fast Red L
Benzo Fast Scarlet G S
Benzo Purpurine 1B, 4B, 6B (rather good)
Benzo Rhoduline Red B, 3B (as a pink good)
Brilliant Purpurine R (rather good)
Congo Red (rather good)
Delta Purpurine 5B, 7B (rather good)
Diamine Red B, 3B
Trona Red 3B, 7B, G G

Oranges: Chloramine Orange G
Mikado Orange G
Orange T A (rather good)

Yellows: Chloramine Yellow M, GG (rather good), H W
Curcumine S (fairly good)
Direct Yellow R (rather good)
Primuline Yellow (rather good)
Thiazole Yellow G (rather good)

Blues: Benzo Chrome Black N (rather good)
Benzo Chrome Black Blue B (rather good)
Benzo Fast Blue B (moderately)
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Black Blue G, 5G, R (rather good)

Violets: Chloramine Violet R (rather good)
Browns: Benzo Chrome Brown B, BS, CR, G, R 3 R, 5 G (rather good)
Cotton Brown I, II, III, IV.
Greys: Benzo Fast Black
Benzo Fast Grey
Benzo Grey
Benzo Grey S extra
Blacks: Pluto Black G

31. **Benzidine colours,** which when **dyed on cotton** after-treated with sulphate of **alumina** are faster to **water:**

Reds: Benzo Fast Pink 2 BL (good)
Benzo Fast Red L, GL (fairly good)
Benzo Fast Scarlet 4 BS, 8 BS and GS (fairly good)
Benzo Purpurine 1 B, 4 B, 4 B conc., 6 B, 10 B (rather good)
Benzo Rhoduline Red B (moderately good), 3 B (fairly good)
Benzo Red S G (rather good), 10 B (fairly good)
Brilliant Congo R (fairly good)
Brilliant Geranine B and 3 B (moderately good)
Brilliant Purpurine 4 B, R (rather good)
Congo Red, 4 R (moderately good)
Delta Purpurine 5 B, 7 B (fairly good)
Diamine Red B, 3 B (fairly good)
Hessian Purple N (moderately good)
Rose Azurine B, G (fairly good)
Oranges: Benzo Fast Orange S (moderately good)
Benzo Orange R (fairly good)
Chloramine Orange G (good)
Congo Orange G (rather good), R (moderately good)
Mikado Orange G (good)
Orange TA (fairly good)
Pluto Orange G (rather good)
Toluylene Orange G (rather good)
Yellows: Chloramine Yellow G G (good) HW (good), 5 G (rather good), M (moderately good)
Chrysamine G, R (good)

Yellows: Curcumine S (fairly good)
Direct Yellow R, R extra (good)
Primuline Yellow superfine (moderately good)
Thiazole Yellow G, R (moderately good)

Greens: Benzo Dark Green B, (rather good), GG (good)
Benzo Green BB, G (good)
Benzo Olive (good)
Brilliant Benzo Green B (rather good)

Blues: Azo Blue (fairly good)
Benzo Azurine G, 3 G (fairly good), R (rather good)
Benzo Blue R W (rather good), 2 R (fairly good)
Benzo Chrome Black Blue B (good)
Benzo Copper Blue B (moderately good)
Benzo Cyanine B, R (fairly good)
Benzo Fast Blue BN (moderately good), G (rather good), 5 R (moderately good)
Benzo Indigo Blue (good)
Benzo Navy Blue B (fairly good)
Benzo Red Blue G (moderately good)
Benzo Black Blue G, R (fairly good), 5 G (good)
Brilliant Azurine B (moderately good), 5 G (fairly good), 2 R, 5 R (rather good)
Brilliant Benzo Blue 6B, 6BS (rather good)
Chicago Blue B (fairly good), R (rather good)
Congo Blue 2B (fairly good)
Diazo Navy Blue 3 B (Dev. A) (fairly good)
Diazo Indigo Blue B, BR extra, M (Dev. A) (fairly good)

Violets: Azo Violet (rather good)
Benzo Bordeaux 6B (moderately good)
Benzo Fast Violet R (rather good)
Benzo Violet R (moderately good)
Chloramine Violet R (rather good)
Congo Corinth B, G (moderately good)

Browns: Benzo Brown B, BR, R extra, 5 R, RC (rather good), D 3 G extra (fairly good)
Benzo Chrome Brown B, BS, CR, G, R, 3 R (fairly good), 5 G (rather good)
Cotton Brown I, II, III
Diazo Brown G (fairly good)

Browns: Direct Fast Brown B (fairly good)
New Toluylene Brown B, BBO, M (fairly good)
Pluto Brown R, GG, NB (fairly good)
Greys: Benzo Fast Grey (fairly good)
Benzo Grey, S extra (fairly good)
Blacks: Benzo Chrome Black B, G, N (good)
Benzo Fast Black (rather good)
Benzo Black, S extra (fairly good)
Direct Blue Black B, 2B, N (fairly good)
Direct Deep Black E, E extra, EW, EW extra, G, RW, RW extra, R, T (fairly good)
Pluto Black A extra, B, 3 B extra, F extra, FR, L extra, R (fairly good), BS extra, CR, G (good).

A recipe for improving the fastness to washing of Benzidine colours dyed on cotton.

Dissolve ½ lb. sulphate of alumina and ½ lb. acetate of soda each in about 2½ gallons of hot water. When the solutions have cooled down, mix same and bring the whole up to 10 gallons. This solution is not stable, as it becomes milky in course of time, forming a basic sulphate of alumina precipitate. Treat the cotton material dyed with Benzidine colours in this solution for 1 hour (turning the goods every 10 mins.) squeeze out and dry. Colours which are susceptible to acids should be passed through a weak soda bath before subjecting them to the above after-treatment.

32. **Benzidine colours,** which when dyed on cotton yarn (warps), are **fast to cross-dyeing:**

Reds: Diazo Bordeaux (Dev. A)
Primuline Yellow (Dev. A)
Trona Red 3 B
Oranges: Mikado Orange G
Yellows: Chloramine Yellow M
Direct Yellow R, R extra
Blues: Benzo Chrome Black Blue B
Benzo Copper Blue B (coppered and chromed)
Benzo Fast Blue B
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Sky Blue
Blacks: Benzo Chrome Black B, N (coppered, chromed)

Blacks: Benzo Chrome Black N (Aniline salt)
Benzo Chrome Black Blue B (Aniline salt)
Benzo Chrome Black Blue B (coppered, chromed)
Diazo Brilliant Black B, R (Dev. A)
Diazo Black BHN (Dev. H) (rather good)
Pluto Black BS extra, G

33. **Benzidine colours** which are especially employed for the dyeing of **cotton linings:** (See also Nos. 17 and 20.)

Reds: Benzo Fast Red L
Benzo Fast Scarlet 4BS, GS
Benzo Purpurine 1B, 4B, 10B
Geranine BB, G

Oranges: Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R
Pluto Orange G

Yellows: Chloramine Yellow M, HW
Chrysophenine, GS
Direct Yellow R, R extra

Greens: Benzo Dark Green B, GG

Blues: Benzo Azurine G, 3G
Benzo Chrome Black Blue B
Benzo Sky Blue, conc., 4B
Benzo Black Blue 5G
Diazo Blue 3R (Dev. A)
Diazo Navy Blue 3B (Dev. A)
Diazo Black BHN, BHN extra, R, R extra

Violets: Azo Violet
Benzo Violet R
Congo Corinth B, G

Browns: Benzo Chrome Brown B, G
Benzo Nitrol Brown G (Paranitraniline)
Direct Fast Brown B
Pluto Brown GG, NB, R

Greys: Benzo Fast Black

Blacks: Benzo Chrome Black (Aniline salt)
Benzo Fast Black
Diazo Black 2B, BHN, BHN extra (Dev. A) (Dev. H)
Diazo Fast Black BHN (Dev. A or H)

Blacks: Direct Blue Black B
Direct Deep Black E, E extra, EW, EW extra, G, RW, RW extra
Pluto Black B, BS extra, G, R, CR
Pluto Black B (Paranitraniline)

31. **Benzidine colours** which are adapted for the dyeing of **cops**: (The colours underlined are those which are most suited.)

Reds: Benzo Fast Scarlet 4BS, 5BS, GS
Benzo Nitrol Bordeaux G (Paranitraniline)
Benzo Purpurine 4B, 4B conc., 10B
Benzo Rhoduline Red B (as a pink)
Brilliant Congo R
Brilliant Purpurine 4B
Delta Purpurine 5B, 7B
Diamine Red B, 3B
Hessian Purple N
Primuline Yellow (Dev. A)
Rose Azurine B, G

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G
Primuline Yellow (Dev. F)
Toluylene Orange G

Yellows: Chloramine Yellow M, HW
Chrysamine G
Chrysophenine
Direct Yellow R, R extra
Thiazole Yellow G

Greens: Benzo Green BB, G
Benzo Olive

Blues: Benzo Azurine G
Benzo Blue 2B, 3B, BX
Benzo Chrome Black Blue B
Benzo Copper Blue B
Benzo Fast Blue 5R
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Sky Blue
Benzo Black Blue G, 5G

Blues: Brilliant Benzo Blue 6B
Diazo Black BHN, BHN extra
Diazo Blue 3R (Dev. A)
Diazo Blue Black
Diazo Navy Blue 3B (Dev. A)
Diazo Indigo Blue B, M, BR extra (Dev. A)
Diazo Red Blue 3R (Dev. A)

Browns: Benzo Brown B, BX, GG, NB
Benzo Chrome Brown B, G, 5G, R, 3R
Benzo Chrome Brown B,G(coppered,chromed)
Benzo Dark Brown
Benzo Nitrol Brown G, R (Paranitraniline)
Cotton Brown III (Paranitraniline)
Diazo Brown G
Diazo Brown R extra (diazotised and developed with soda)
Diazo Brown G (Dev. E)
Diazo Brilliant Black B, R (diazotised and developed with soda)
Direct Fast Brown B, GG
Direct Fast Brown B (Paranitraniline)
Pluto Brown R
Toluylene Orange G(»)

Greys: Benzo Fast Grey
Benzo Fast Black
Diazo Blue Black (Dev. A)
Diazo Black G (Dev. H)

Blacks: Benzo Chrome Black B, N (after-chromed)
Benzo Fast Black
Diazo Brilliant Black B, R (Dev. A)
Diazo Black 2B (Dev. A) (Dev. H)
Diazo Black BHN, G, H, R (Dev. A)
Direct Blue Black B (topped with Aniline Black)
Direct Deep Black E, E extra, RW, RW extra
Direct Deep Black RW (Dev. A)
Pluto Black CR, R (chromed)
Pluto Black A, F extra, TG extra, TG extra conc.

The machines mostly in use for cop dyeing are those manufactured by the following firms:

1. Rheinisch. Copsfärberei, Barmen,

2. C. G. Haubold jr. Chemnitz (Haase)
3. H. Schirp, Unter-Barmen, (A. de Keukelaere)
4. Obermaier
5. U. Pornitz (Chemnitz)
6. C. Rösch (Mülheim on the Ruhr)
7. Scharmann & Geuting, Bocholt
8. Zittauer Maschinenfabrik, Kiessler (Schubert)
9. Carl Wolf, Schweinsburg

and many others.

There are divers opinions as to the actual value of a cop dyeing machine, but it must not be overlooked that the selection of the proper dyestuffs is of just as much importance and only very easily soluble colours should be employed for this class of work.

Benzidine colours, dyed direct.

For direct colours, such as Benzo Purpurine 4B etc., which are easily soluble and dye easily level, it is quite sufficient to previously dissolve the colour in boiling water; enter the goods into the bath containing 15% Glauber's salt crystals and 2% soda ash at 140° Faht. and work for ½ hour at this temperature. Under certain circumstances it is advisable, especially when using standing baths, to add no salt. When dyeing light shades, such as greys and pinks, it is better to enter cold and then to warm up to 104° Faht. within 15 minutes, and allow the goods to remain in the bath for another ¼ hour. When dyeing with very small quantities of colour, dye cold without an addition of Glauber's salt.

Benzidine colours, which are afterwards diazotised and chromed.

Dye the cotton first with the respective Benzidine colour. When dyeing dark shades enter the goods immediately at 140°—160° Faht. and work for ¾ hour, then rinse, diazotise with 4% nitrite and 10% hydrochloric acid for 20 minutes cold, wash and then enter the developing bath containing 2% Developer A or H for 20 minutes; afterwards rinse. When dyeing Benzidine colours which are afterwards treated with chrome, bottom first, rinse and then enter a bath containing up to 3% chromate of soda, up to 3% blue stone and up to 3% acetic acid, and finally wash.

Basic colours.

Basic colours are dyed with difficulty on cops, and it is not at all easy to dye them so that the cops have a uniform shade all through. In order to produce uniform shades dye as follows: Boil the cops merely in water, then enter the tannin bath (containing 4% tannic acid), working in a copper machine or tin plated vessel. Work for 20 minutes at 160° Faht. and then enter the cold bath containing 1—2% tartar emetic. After this operation dye the goods with the addition of at least 2% alum, but do not add the colour simutaneously to the bath with the alum, as otherwise the shades are liable to turn out uneven. Treat the cops mordanted with tannic acid for 10 minutes in a cold bath containing 2% alum, and then enter the basic colour cold in several portions. After working cold for sometime, warm up to 86°—104° Faht. and continue dyeing.

Sulphide colours (Katigen colours).

It is more difficult to dye sulphide colours on cops than other dyestuffs, as during the whole dye process the cops may not come into contact with the action of the air, otherwise the colours would oxidise on the top of the cops. For this class of colours it is advisable to dye in iron machines, as copper and copper alloy are affected by the action of sulphide of soda.

Dyeing with Katigen Black SW and TG.

Boil up the cops first in a bath containing 2—3% soda ash, then enter the boiling bath at once containing 25% colour, 20% sulphide of soda crystals, 60% Glauber's salt crystals (or 30% common salt) and 8% soda ash. During the whole dye process the cops must be completely immersed in the liquor. After dyeing for $^3/_4$ hour draw the liquor off, by means of vacuum, steam, whereby the shade becomes bluer in tone, and then let in cold water. After washing the cops with cold water twice, and once with water containing $^1/_2$—2% acetic acid, after-treat in a fresh bath, containing 2% chromate of soda, 3% alum and 3% acetic acid or, according to another recipe with 3% chrome alum and 3% acetic acid. Work in this bath for $^1/_2$ hour at 160° Faht., wash and enter a bath at 86° Faht. containing 1% starch and 1% gum arabic

or into a bath containing 2% soda ash and 2% ammonia, so as to produce a fuller and bluer shade. Other Katigen colours are dyed in exactly the same way. **Katigen Indigo RL extra** is dyed in a similar manner to Katigen Blacks, but it is not absolutely necessary to after-treat the goods. Cheeses are dyed in the same way as cops.

35. **Benzidine colours** which are employed for the **dyeing** of **sewing yarns:**

Reds: Benzo Fast Scarlet 4BS, 5BS, 8BS, GS
Benzo Nitrol Bordeaux G (Paranitraniline)
Benzo Purpurine 4B, 10B
Geranine G
Hessian Purple N
Primuline Yellow (Dev. A)

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Mikado Orange G
Pluto Orange G
Toluylene Orange G

Yellows: Chloramine Yellow GG, M
Chrysamine G
Chrysophenine
Direct Yellow R extra
Thiazole Yellow G

Greens: Benzo Dark Green B
Benzo Green BB

Blues: Benzo Blue RW (coppered)
Benzo Chrome Black Blue B
Benzo Sky Blue
Benzo Black Blue G
Brilliant Benzo Blue 6B (coppered)
Diazo Indige Blue B, M, BR extra (Dev. A)

Violets: Azo Violet
Benzo Violet R

Browns: Benzo Chrome Brown B, G, 5G, 3R
Cotton Brown I, III
Pluto Brown R

Greys: Benzo Fast Grey
Benzo Grey

Blacks: Benzo Chrome Black B, N (Aniline salt)

Blacks: Benzo Chrome Black N (coppered, chromed)
Diazo Brilliant Black B, R (Dev. A)
Diazo Fast Black 3B, G (Dev. H)
BHX (Dev. A, Dev. H)
Diazo Fast Black 3B, G (Dev. H) (coppered)
Diazo Black 2B, 3B, BHN, R (Dev. A)
Direct Deep Black E, E extra, RW extra
Pluto Black BS extra G, L extra, F extra, F extra conc.

36. **Benzidine colours** which are particularly adapted for the **dyeing** of **mercerised cotton yarns** or **piece goods:**

Reds: Benzo Fast Red L, GL
Benzo Fast Scarlet 4BS, 5BS, 8BS, GS
Benzo Purpurine 4B, 10B
Benzo Rhoduline Red B, 3B
Brilliant Congo R
Brilliant Geranine B, 3B
Geranine BB, G
Primuline Yellow (Dev. A)
Trona Red 3B, 7B, GG

Oranges: Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R
Pluto Orange G

Yellows: Chloramine Yellow GG*, M
Chrysophenine
Thiazole Yellow G

Greens: Benzo Green G
Brilliant Benzo Green B

Blues: Benzo Azurine G
Benzo Black Blue 5G
Benzo Blue BX
Benzo Chrome Black Blue B
Benzo Fast Blue B, BN, R
Benzo Indigo Blue
Benzo Navy Blue B
Benzo Sky Blue
Benzo Sky Blue (coppered)
Brilliant Azurine B, 5G, 2R, 5R
*Brilliant Benzo Blue 6B
*Brilliant Benzo Blue 6B (coppered)

* Are not adapted for **bleached** mercerised piece goods.

Blues: Diazo Black BHN, R extra
Violets: Benzo Fast Violet R
Benzo Violet R, RL extra
Chloramine Violet R
Congo Corinth B
Heliotrope BB
Browns: Benzo Chrome Brown CR, G, 3R, 5G
Pluto Brown GG, NB, R
Blacks: Benzo Chrome Black B, N (coppered, chromed)
Benzo Fast Black
Diazethyl Black B, R (Dev. A) (Dev. B)
Diazo Blue Black
Diazo Brilliant Black B, R (Dev. A) (Dev. B)
Diazo Fast Black BHX (Dev. A) BZ
Pluto Black A, BS extra, 3B extra, FR, G, F extra, CF extra, A extra, TG extra, TG extra concentr.

The affinity of the cotton fibre to most colours is considerably increased by mercerisation. As the colour rushes on too quickly, care has therefore to be taken that the colour falls on to the fibre slowly, and this can be obtained by adhering to the following:

1. Select colours which do not fall on too quickly. (See above.)
2. Avoid the use of short liquors; for medium and dark shades; of course, the liquor should not be too long.
3. Reduce the quantity of such salts (Glauber's and common salt) which tend to cause the colour to fall on the fibre.
4. Increase the addition of certain ingredients such as soda, soap and Turkey Red oil, etc.
5. Regulate the temperature of the dye bath: enter the goods at a low temperature and raise same gradually.

N. B. Avoid all such ingredients that would spoil the lustre of the mercerised cotton, e. g. alum.

Directions for Dyeing.

Light shades are dyed best at the ordinary temperature (not above 105° Faht.) with the addition of 10% soap. When dyeing medium shades it is best to enter the goods cold and bring the bath up to 140° Faht.

at the most, dyeing with the addition of 10% Glauber's salt crystals and 10% soap. Dark shades are dyed at 105—212° Faht. with 20% Glaubers's salt crystals and 5% soda ash. Care must be taken not to add the dyestuff and Glaubers's salt to the dye bath all at once at the commencement, but in small portions after running the goods several lengths. When adding colour to the bath steam should be shut off. It is advisable in dyeing yarns to squeeze them out occasionally during the dye process.

For piece goods Turkey Red oil* is often used instead of soap. In order to obtain a rustling handle of the yarn, which is often demanded, acetic acid alone, on account of its beeing so easily volatilised, is not very well adapted for the purpose. It is therefore better to use a mixture of acetic acid and lactic acid (1 2/3 oz. of each per gallon liquor) or another process which has lately been recommended of employing Scrooping salt Bö (1 1/5—1 2/3 oz per gallon) subjecting the goods previously to one or more soap baths. For unbleached yarn a previous soaping is absolutely necessary to produce the rustling handle.

Mercerising.

Only cotton yarns and piece goods are mercerised, and various kinds of machines are employed to produce the silk lustre

a) Yarns.

On long staple cottons, particularly Egyptian, so-called Macco cotton, a fine silk lustre can be obtained.

Machines manufactured by the following firms have proved to be especially serviceable for mercerising yarns:

Joh. Kleinewefer's Söhne, Crefeld; J. P. Bemberg, Baumwollind.-Ges., Barmen-Rittershausen; C. G. Haubold jr, Chemnitz; Tillmann Gerber Söhne, Crefeld; B. Cohnen, Grevenbroich; Wansleben, Crefeld; Franke, Chemnitz; etc.

* N. B. Turkey Red oil produces a flabby touch. Where this soft handle is not wanted, and the smell of the Turkey Red oil might be objected to, then it can be substituted by using soap.

b) Plain Shades on Piece Goods.

Machines manufactured by the following firms are generally employed for mercerising piece goods:

Jeanmaire in Mülhausen, Elsace; Simon in Villefranche; C. G. Haubold jr., Chemnitz; C. A. Gruschwitz in Olbersdorf Nr. Zittau, F. Mommer & Co., Barmen; B. Cohnen, Grevenbroich, etc.

In these machines the cotton is treated with caustic soda of at least 57° Tw. under tension. The soda lye is prepared by either diluting the ordinary commercial quality of 76° Tw. to the required degree, or by dissolving the solid caustic soda in water and diluting it then to the required strength.* (For 10 gallons of soda lye of 57° Tw. about 35 lbs. of solid caustic soda are necessary.)

In order to obtain satisfactory results the following should be carefully observed:

The temperature of the mercerising bath should never get above 65° Faht. The goods should be impregnated with lye as uniformly as possible, for which purpose 5—6% alcohol are in many instances added to the bath; the duration of the action of the lye should be always the same length of time. Rinse or acidulate carefully. By careful attention to the above rules irregularities can be avoided, which in dyeing make themselves especially perceptible. Goods which are bleached well, obtain a better lustre than raw material.

c) Mercerised Styles.

Styles printed on cotton cloth with soda lye, afterwards dried at a moderate temperature and washed, then dyed with Benzidine or Basic colours assume a deeper shade in those parts mercerised, as they have a greater affinity to the Benzidine or Basic dyestuff than the unmercerised material. In this manner two coloured effects can be obtained with one colour and

* If the soda lye can be cooled down to 45—50° Faht. then it need only be of 42° Tw. It is absolutely necessary to cool down the soda lye if the goods to be mercerised are still damp. After several hours already, the temperature rises to 85—95° Faht., and the mercerisation is of a correspondingly less effect, whereas when cooling down, the soda lye can be kept at 60° Faht.

one printing roller. When dyeing with dischargeable Benzidine dyestuffs the colour can of course be white or colour discharged, and according to the Benzidine colour employed they can be diazotised and developed, or after-treated with copper sulphate, bichrome or diazotised Paranitraniline. Prints thus obtained can be topped with Basic dyestuffs.

Directions for Printing.

1 1/4 pints or 625 ccm. soda lye 106° Tw. thickened with
3/4 » » 375 grms. gum water 1 : 1
1000 grms.

When employing **Basic colours** the pieces printed with soda lye, washed and dried are then padded with 1 2/5 oz tannic acid per gallon, afterwards dried and prepared with 1 3/5 oz. tartar emetic per gallon water. The dyed shades can of course be white or colour discharged.

37. **Benzidine colours,** which when dyed on cotton yarns, are especially employed for **fancy woven** cotton **goods:**

Reds: Benzo Fast Pink 2BL
Benzo Nitrol Bordeaux G (Paranitraniline)
Benzo Rhoduline Red B, 3B
Brilliant Geranine B, 3B
Diazo Bordeaux (Dev. A)
Diazo Rubine B (Dev. A)
Geranine G
Primuline Yellow (Dev. A)

Oranges: Chloramine Orange G
Primuline Yellow (Dev. F)

Yellows: Chloramine Yellow M, GG, HW
Chrysophenine
Direct Yellow R, R extra

Greens: Benzo Green BB, G (fluoride of chrome)
Benzo Dark Green B, GG (fluoride of chrome)

Blues: Benzo Azurine G, 3G (coppered)
Benzo Copper Blue B (coppered, chromed)
Benzo Indigo Blue
Benzo Chrome Black Blue B
Benzo Navy Blue B
Brilliant Azurine 5G (coppered)
Brilliant Benzo Blue 6B
Brilliant Benzo Blue 6B (coppered)

Blues: Diazo Blue 3R (Dev. A)
Diazo Navy Blue 3B (Dev. A)
Diazo Indigo Blue B, M, R (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazurine B, (Dev. A)
Violets: Benzo Violet R
Chloramine Violet R
Browns: Benzo Chrome Brown B, CR, G, 5G (coppered, chromed)
Benzo Nitrol Brown G, R, 2R, RO (Paranitraniline)
Direct Fast Brown B (Paranitraniline)
Pluto Brown R (Paranitraniline)
Greys: Benzo Fast Black
Benzo Fast Grey
Blacks: Benzo Chrome Black N (Aniline Salt)
Benzo Chrome Black Blue B (Aniline Salt)
Diazo Brilliant Black B (Dev. A)
Diazo Fast Black 3B, G (Dev. H)
Diazo Black 2B, BHN (Dev. A) (Dev. H)
Pluto Black CR (chromed)

38. **Benzidine colours**, which are adapted for **dyeing canvas** etc.:

Yellows: Chloramine Yellow M
Direct Yellow R, R extra
Greens: Benzo Dark Green B
Benzo Green G, BB (fluoride of chrome)
Blues: Benzo Azurine G (coppered)
Benzo Copper Blue B (coppered)
Diazo Blue 3R (Dev. A) (coppered)
Diazo Navy Blue 3B (Dev. A) (coppered)
Diazo Indigo Blue M, BR extra (Dev. A)
Browns: Benzo Chrome Brown G, 3R
Benzo Chrome Brown CR, G, 5G, R (coppered, chromed)
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra, (coppered, chromed)
Blacks: Direct Blue Black N
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra
Pluto Black G

39. **Benzidine colours** which are adapted for **padding** etc.:

Reds: Benzo Fast Pink 2BL
Benzo Fast Red L, GL
Benzo Fast Scarlet 4BS, 5BS, 8BS, GS
Benzo Purpurine 1B, 4B
Benzo Red 10B
Benzo Rhoduline Red B, 3B
Geranine BB, G

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Pluto Orange G
Toluylene Orange R

Yellows: Brilliant Yellow
Chloramine Yellow GG, M
Chrysamine G, R
Chrysophenine, GS
Direct Yellow R, R extra
Primuline Yellow
Thiazole Yellow G, R

Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B

Blues: Benzo Blue 2B, 3B
Benzo Chrome Black Blue B
Benzo Cyanine B, 3B, R
Benzo Fast Blue B, BN, G, R, 5R
Benzo Sky Blue, concentrated, 4B
Benzo Black Blue G, 5G
Brilliant Azurine B, 5G
Brilliant Benzo Blue 6B
Brilliant Sulphon Azurine R
Diazo Blue Black
Diazo Black B

Violets: Azo Violet
Benzo Bordeaux 6B
Benzo Violet R, RL extra
Benzo Fast Violet R

Violets: Chloramine Violet R
Congo Corinth G
Heliotrope BB

Browns: Benzo Brown BR, BX, D3G extra, G, NBX, RC, 5R, R extra,
Benzo Chrome Brown B, BS, G, 5G, R, 3R
Benzo Dark Brown
Cotton Brown I, II, III, IV
Direct Bronze Brown
Direct Fast Brown B, GG
New Toluylene Brown B, BBO, M
Pluto Brown GG, NB

Greys: Benzo Fast Grey
Benzo Fast Black
Benzo Grey S extra
Diazo Fast Black BHX, SD
Direct Blue Black 2B
Direct Deep Black E, RW
Pluto Black B, BS extra, FR, F extra, G, L extra, R, R extra, TG extra, TG extra concentrated

General recipe for slop-padding Benzidine dyestuffs.

Dissolve:

2½—25 oz. or 25—250 grms. **Benzidine colour** and
10 » » 100 » phosphate of soda in
62 gallons » 100 litres water, in some cases with the addition of some dextrine, mucilage of fragacanth, etc.

Slop-pad once or twice and then dry.

Padding can also be done in the slashing.

40. **Benzidine colours,** which are adapted for **direct cotton printing:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Red L, GL
Benzo Fast Scarlet 4BS, GS
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Rhoduline Red B
Benzo Red SG, 10B
Brilliant Geranine B, 3B
Brilliant Congo R
Congo Red, 4R

Reds: Congo Rubine
Delta Purpurine 5B
Diamine Red B
Geranine G
Rose Azurine B, G

Oranges: Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Pluto Orange G
Toluylene Orange G

Yellows: Chloramine Yellow GG, M
Chrysamine G, R
Chrysophenine
Direct Yellow R, R extra
Thiazole Yellow R

Greens: Benzo Dark Green GG
Benzo Green BB, G
Benzo Olive

Blues: Azo Blue
Benzo Azurine G, R
Benzo Blue RW
Benzo Fast Blue BN
Benzo Cyanine 3B
Benzo Sky Blue, concentrated
Benzo Black Blue G, 5G
Brilliant Benzo Blue 6B
Diazo Fast Black G

Violets: Azo Violet
Benzo Bordeaux 6B
Benzo Fast Violet R
Benzo Violet R, RL extra
Chloramine Violet R
Congo Corinth B, G
Heliotrope BB

Browns: Benzo Brown B, GG, D3G extra, NB, RC
Benzo Chrome Brown B, BS, G, R
Cotton Brown I, II, III, IV
Direct Bronze Brown
Pluto Brown GG, NB

Greys: Benzo Fast Black
Benzo Grey S extra
Direct Blue Black B

Greys: Direct Deep Black T
Blacks: Direct Blue Black B
Direct Deep Black E, R W, T
Pluto Black BS extra, L extra

General recipe for Printing Benzidine colours.

Although prints of Benzidine colours are not very fast to washing, they serve as a rule for many kinds of prints on upholstery cloth, linings, flannelette, etc. The colours are fixed with the aid of phosphate of soda, borax, etc. Wheat starch, mucilage of tragacanth, British gum, etc. are employed as thickening agents.

For very cheap linings, albumen can be substituted with ammoniacal caseine solution.

Recipe I (with phosphate of soda.)

Boil:

1 oz.	or	10 grms.		**Benzidine colour**
3 1/2 pints	»	635	»	water
5 oz.	»	50	»	wheat starch and
1 1/2 pints	»	300	»	mucilage of tragacanth 65 : 1000, then add
1/2 oz.	»	5	»	phosphate of soda
		1000 grms.		

After printing and drying steam for 1/4—1 hour without pressure. In order to produce shades faster to washing albumen can be added to the printing paste.

Recipe II (with albumen.)

Boil:

1 1/2 oz.	or	15,6 grms.		**Benzidine colour**
5 »	»	50	»	wheat starch and
3 pints	»	547	»	water, then add
1 1/4 oz.	»	12,4	»	phosphate of soda, and when cool, add
1 1/4 pints	»	250	»	albumen water 500—700
5/8 pint	»	125	»	mucilage of tragacanth 65 : 1000
		1000 grms.		

Work in the same manner as above described.

41. **Benzidine colours,** which are adapted for **mercerising purposes** when **printed on cotton direct:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Red L, GL
Benzo Fast Scarlet GS, 4BS
Benzo Purpurine 4B, 10B
Benzo Red 10B
Benzo Rhoduline Red B
Brilliant Geranine B, 3B
Brilliant Purpurine R, 4B
Congo Red
Congo Rubine
Delta Purpurine 5B
Diamine Red B
Geranine G

Oranges: Benzo Orange R
Chloramine Orange G
Congo Orange G
Mikado Orange G
Toluylene Orange G

Yellows: Chloramine Yellow M
Chrysophenine
Direct Yellow R, R extra
Primuline Yellow, superfine
Thiazole Yellow G, R

Blues: Benzo Chrome Black Blue B
Benzo Cyanine B, 3B, R
Benzo Fast Blue B, BN, G, 5R
Benzo Sky Blue, concentrated
Benzo Black Blue G, 5G
Brilliant Benzo Blue 6B

Violets: Azo Violet
Benzo Bordeaux 6B
Benzo Fast Violet R
Benzo Violet RL extra,
Chloramine Violet R
Congo Corinth G

Browns: Benzo Brown B
Benzo Chrome Brown B, G, R
Cotton Brown I, II, III

Greys: Benzo Grey S extra
Diazo Black BHN

Greys: Direct Blue Black B
Direct Deep Black T
Pluto Black L extra

Recipe for Producing Crepon Effects by Mercerising Cotton Fabrics.

Crepon effects can be obtained by printing a gum solution, with or without any addition of colour, on a white or dyed bottom, then dry and run through concentrated soda lye, whereby those parts not treated with gum water contract, the gumed parts in consequence becoming crimped.

Directions:

a) for printing Benzidine colours direct on undyed cotton cloth.

Dissolve:

1—1 1/2 oz. or 3—4 3/4 grms. **Benzidine colour** in
3/4 pint » 47—45 1/4 » water, and thicken with
1 gall., 7 1/4 pint » 950 » gum water 1 : 1

1000 grms.

Should the colour not dissolve in the quantity of water stated, then boil up the solution again in the gum water. It is advisable to use only fine gum qualities.

After printing, dry, then steam without pressure for 1/4—1/2 hour, run through soda lye 52° Tw., wash, and dry carefully.

b) for cotton material dyed with Benzidine colours.

Crepon effects are obtained, by printing on the dried goods stripes with gum water 1 : 1, dry, pass through soda lye 52° Tw., wash and dry carefully.

c) for cotton material dyed with Basic colours.

The cotton material, which has been mordanted with tannic acid and passed through tartar emetic in the usual way (see No. 60) **is dyed with Basic colours** (see No. 78), then wash, dry and afterwards treat as stated above in b.)

d) for cotton fabrics dyed with Mordant colours.

Dye on chrome padded cotton cloth (see No. 44) with the mordant colours adapted for the purpose, (see No. 59) and treat the dried goods same as stated above in b.)

42. **Benzidine colours**, which in combination with **oxidising agents** are adapted for **colour discharges** on **Indigo, Alizarine-Chrome-Mordant dyestuffs, Basic dyestuffs** etc. (resisting these totally or partly); the same colours are also employed for **discharging Aniline Black:**

Reds: Benzo Fast Scarlet GS
Brilliant Geranine B
Geranine G

Oranges: Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R
Mikado Orange G

Yellows: Chloramine Yellow GG, M
Chrysophenine

Blues: Benzo Sky Blue, concentrated

Violets: Chloramine Violet R

Browns: Benzo Brown B, BX, BR, G, GG, NB, NBR, NBX, R extra, 5R

a) Yellow discharge on Indigo dyed material.

Boil:

7 5/8 pints or 4 20,1 grms. chlorate of soda solution 75° Tw., 500 : 300 grms. water
4 1/2 lbs. » 155,5 » China clay
1 pint » 42,1 » water
3/4 lb. » 25,2 » **Chrysophenine** and
5 1/2 lbs. » 188,9 » British gum, to which add
10 oz. » 21,1 » red prussiate of potash powder; and when cold
1 1/4 lbs. » 42,1 » citric acid dissolved in
2 1/2 pints » 105,0 » water

1000 grms.

Steam without pressure for 1/4—1/2 hour, wash and dry.

b) Yellow discharge on Alizarine Bordeaux.

Boil:

1 lb. or 33 grms. **Chrysophenine or Chloramine Yellow M**
6 » » 192 » British gum
6 1/4 pints » 247 » water
1/2 lb. » 16 » chlorate of potash and
1/2 » » 17 » chlorate of soda, allow to cool down somewhat and add
5 lbs. 2 oz. » 165 » red prussiate powder (sieved); and when cold, add
7 pints » 330 » citrate of soda 38° Tw.

1000 grms.

This Yellow discharge is printed on pieces, slop padded with mordant colours dischargeable with oxidising agents in conjunction with acetate of chrome, e. g. on an Alizarine Bordeaux bottom.

Dissolve:

12 1/2 oz.	or 25 grms.	**Alizarine BXP 20%** in
1 1/8 pint	» 45 »	ammonia spec. grav. 0.950
3/4 noggin	» 10 »	glycerine 48° Tw. and
5 pints	» 200 »	water, to which add
15 »	» 600 »	water
1 3/4 noggs.	» 20 »	acetate of chrome 32° Tw.
2 1/2 pints	» 100 »	water
	1000 grms.	

Steam for 1 hour without pressure, soap open for 3 minutes at 87° Faht., wash and squeeze also full width, then dry.

c) Pink discharge on Aniline Black.

Print the following colour on white cotton cloth, and steam without pressure for 1/2 hour.

Pink Discharge.

19 3/4 oz.	or 19,7 grms.	**Geranine G**
4 1/4 pints	» 85,5 »	water
14 3/4 lbs.	» 236,8 »	zinc white
14 1/2 pints	» 289,5 »	mucilage of tragacanth 65 : 1000
12 3/4 »	» 289,5 »	gum water 1 : 1
1 3/4 »	» 39,5 »	glycerine 48° Tw.
1 3/4 »	» 39,5 »	olive oil
	1000 grms.	

Slop-pad with Ferrocyanide of Aniline Black (See No. 69, slop-pad Aniline Black II), dry, oxidise in the Mather & Platt, pass through silicate of soda, wash and dry.

d) Yellow or Blue discharge on Aniline Black.

Slop-pad: Ferrocyanide of Aniline Black (See No. 69 slop-pad Aniline Black II), dry, and discharge with:

Boil:

Yellow Discharge.

12 oz.	or	12 grms.		**Chloramine Yellow M**
15 pints	»	303	»	water
12 1/2 »	»	250	»	mucilage of tragacanth 65 : 1000 and
1 1/2 galls.	»	250	»	starch tragacanth thickening (K), to which add
1 1/4 lbs.	»	20	»	phosphate of soda, and when luke warm, add
9 1/2 „	»	150	»	acetate of soda
2 1/2 noggs.	»	15	»	soda lye 65° Tw.
		1000 grms.		

Blue Discharge.

1 lb. 7 1/4 oz	or	23,3 grms.		**Benzo Sky Blue**
3 1/2 pints	»	69,9	»	water
13 lbs.	»	208,8	»	zinc white
17 2/5 pints	»	348,1	»	mucilage of tragacanth 65 : 1000
10 »	»	256,8	»	gum solution 1 : 1
1 1/2 »	»	34,9	»	glycerine 48° Tw.
1 1/2 »	»	34,9	»	olive oil
9/10 »	»	23,3	»	bisulphite of soda 65° Tw.
		1000 grms.		

Steam for 5 minutes in the Mather & Platt, pass through silicate of soda, wash and dry.

43. **Mordant** colours which are adapted for **dyeing** as well as for **printing cotton:**

Reds: Alizarine Purpurine in paste
Alizarine Red I extra*, I extra new, IP*, IIAB, IIB, IIA, IIAG, IIAGP*, IG, IGG, IIGG, WRB, SX extra*, SX extra new*, RF, RFX, SX, V, VP*, RIVP*, RA, RAN, RAG, X, XP*, XG, XGP* in paste.
Brilliant Chrome Red in paste
Chrome Red R in paste and in powder
Eosine S extra bluish, S extra yellowish
Rhodamine B, G, S

Oranges: Alizarine Yellow R in paste and in powder

These brands marked with an asterisk are especially adapted for printing.

Oranges: Alizarine Orange G, GG, RP* in paste, R in paste and in powder**
Diamond Orange in paste

Yellows: Alizarine Yellow 3 G in powder, G G in paste
Anthracene Yellow in paste
Chrome Yellow in paste, D, G in powder, R extra in paste and in powder
Diamond Flavine G in paste and in powder
Diamond Yellow G in paste

Greens: Alizarine Viridine FF in paste* and in powder, D G in paste
Azo Green in paste
Chrome Green in powder
Coeruleïne in paste and in powder, S* and S W in paste

Blues: Alizarine Blue G G and G W and R double, B M single in paste, S and S extra, S R and S R extra, S W in paste and in powder
Alizarine Cyanine G extra, G G, R, R R, R extra in paste and in powder
Alizarine Sapphirole B, S E, F B S in powder and in paste*, C in powder
*Alkali Blue 3 B
Brilliant Alizarine Blue G and R in paste and in powder, S D in powder
Chrome Blue in paste
Celestine Blue B in powder
Gallamine Blue in paste
Gallo Cyanine in paste and in powder
New Victoria Blue B
Victoria Blue B

Violets: Alizarine Bordeaux B in paste and in powder B P*, B B P*, G G, G, G P*, G G P* in paste
Alizarine Cyanine R, R extra, 3 R double, W R R, W R B, R R, G extra in paste and in powder
Alizarine Heliotrope R in paste
Alizarine Red I extra, I P in paste

Those P brands marked with * are especially adapted for printing, whereas those qualities marked with ** are only suitable for dyeing.

Violets: Chrome Violet in paste
Gallëine in paste
Browns: Alizarine Bordeaux B, G in paste and in powder G, GG, BP*, BBP*, GP*, GGP*, in paste
Alizarine Orange G, GG, RP in paste, R in paste and in powder**
Alizarine Red (all brands, please refer to Red)
Anthracene Brown G, R in paste and in powder, GG, RP, K, W in paste
Diamond Brown in paste
Greys: Alizarine Blue Black B and 3B in paste and in powder
Alizarine Cyanine Black G in paste and in powder
Alizarine Fast Grey in paste and in powder, BG in paste
Blacks: Alizarine Blue Black B and 3B in paste and in powder
Alizarine Cyanine Black G in paste and in powder
Alizarine Fast Grey in paste and in powder BG in paste

44. **Mordant** colours, which are adapted for **dyeing cotton mordanted** with **alumina** as well as for **printing cotton** with **alumina mordant:**

Reds: Alizarine Purpurine in paste
Alizarine Red I extra, I extra new, IP*, IIAB, IIB, IIA, IIAG, IIAGP*, IG, IGG, IIGG, WRB, RF, RFX, SX extra*, SX extra new*, SX, V, VP*, RIVP*, RA, RAN, RAG, X, XP*, XG, XGP* in paste
Oranges: Alizarine Orange G, GG, RP* in paste, R in paste and in powder
Yellows: Anthracene Yellow in paste
Greens: Coerulëine in paste and in powder, S and SW in paste
Blues: Alizarine Sapphirole B, SE, FBS in powder and in paste*, C in powder
Celestine Blue B

Those products marked ** are only adapted for dyeing.
Those products marked with * are best adapted for printing.

Blues: Gallamine Blue in paste
Gallo Cyanine in paste and in powder
Violets: Alizarine Cyanine R, R extra, WRR, WRB, RR, G extra, 3R double in paste
Alizarine Heliotrope R in paste
Browns: Alizarine Bordeaux B in paste and in powder, G, GG, BP*, BBP*, GP*, GGP* in paste
Anthracene Brown G, R in paste and in powder, GG, RP*, K, W in paste
Greys: Alizarine Cyanine Black G in paste and in powder

Those products marked with * are best adapted for printing.

Recipe for dyeing or printing mordant colours on or with alumina mordants.

Dyeing.

1. Yarn Dyeing.

a) Boiling off.

Boil 100 lbs. cotton yarn for 2—3 hours with 2 ½ lbs. soda ash, then wash well and hydroextract. Soda can also be substituted by caustic soda. For pale pink shades it is best to take bleached cotton yarn.

b) Oiling.

Wet out the cotton yarn uniformly with a solution or an emulsion of one part Turkey Red oil 50% and 9—10 parts water, then hydroextract or wring out and dry at 113° Faht. By an addition of 1—3 ½ oz. stannate of soda per 10 gallons solution more fiery lakes are obtained on the fibre.

c) Mordanting.

The goods, which in some cases have been previously treated with a decoction of sumac, can be mordanted with either acetate- or sulpho-acetate of alumina 5—8° Tw. according to the depth of shade desired (about 3 ¼ oz. soda ash per lb. sulphate of alumina, and 1 lb. sulphate of alumina yields about 1 gallon liquor 10° Tw.). Saturate the cotton yarn well and uniformly, wring out tightly, and dry for about 24 hours at 105° Faht. If the weather permits it is advisable to hang the yarn in the open air for ½ or a whole day, and then dry at 105° Faht.

d) Chalking.

Work the dried and mordanted cotton yarn for about $^1/_2$ hour in a bath at 105° Faht. containing 8 oz. whitening per 10 gallons water, allow the goods to remain in it for some time, then wash well and commence dyeing at once.

e) Dyeing.

Water for dyeing should be somewhat calcareous ($6^1/_4$° hardness), but if the water is too hard it must be corrected with acetic acid. Water containing iron is quite useless for dyeing purposes. Should the water be too soft then add acetate of lime.

Prepare the dye bath with 8—12 % Alizarine colour previously stirred up with water, and add the colour solution to the bath through a fine hair sieve; sometimes additions of Turkey-Red-Oil, tannic acid, sumach, chalk, etc. are also made.

Dye cold first for $^1/_2$ hour, then raise the temperature of the dye bath within $^3/_4$ hour slowly to 165° Faht., and dye at this temperature for about $^1/_2$—1 hour. Afterwards rinse, wring out and hydroextract.

f) Oiling.

In order to improve the fastness of the colour and to produce brighter shades, the goods can be mordanted again with Turkey-Red-Oil mordant as above mentioned under b), then hydroextract and dry. This oiling process can be entirely omitted, and the goods simply steamed directly after dyeing.

g) Steaming.

Steam the dried yarn for about $1^1/_2$ hours with $14^1/_2$ lbs. pressure.

h) Brightening.

Treat the steamed cotton yarn with 5 lbs. olive oil soap, 5 oz. soda and $3^1/_2$ oz. stannate of soda per 220 gallons water for 100 lbs. cotton yarn, for 1—$1^1/_2$ hours with $14^1/_2$ lbs. pressure or 2—3 hours without pressure at 105—140—212° Faht. according to the colour and the depth of shade (if necessary with the addition of some tin crystals), then wash well and dry. Yarns dyed with Alizarine Red are often dried in the open air, as at a lower temperature the shade remains more fiery.

2. Piece Dyeing.

a) Plain Shades.

Slop-pad the cotton cloth with sulpho-acetate of alumina 4—7° Tw. and dry in the hot flue; or thicken the sulpho acetate of alumina with burnt starch and flour, and pad on the printing machine containing 2 rollers, then dry in the hot chamber. The mordanted pieces are first oxidised continuously for 20—40 mins. in the oxidising chamber with moist temperature, then hung up for 4 days in the ager, also with moist temperature, and then treated with silicate of soda and cow dung (see dunging liquors on page 88).

For 1 yd. cotton cloth 28 ins. wide take about 1/3 oz. Alizarine Red 20%, 1/5 oz. Turkey-Red-oil, 1/7 oz. sumac leaves and 1—3 1/2 pints glue solution 45 : 1000 water, raise the temperature within 1 1/2 hour to 185° Faht., wash, dry, slop-pad, if necessary with Turkey-Red-oil solution 1 : 10—15, steam for 1 hour with 7 1/2 lbs. pressure, soap for 1/2 hour at 185° Faht. with 1/2 oz. olive oil soap per gallon water, wash and dry. By adding about 5 oz. tin crystals and 14 oz. soda crystals to 160—220 gallons soap solution a more fiery red is obtained (tin lake).

The oiled and steamed cotton cloth can also be slop-padded with alum solution, which has been partly precipitated with soda. The pieces remain in the rolled up state for 1 hour, are then dried in the ager, washed on the winch, and dyed with Alizarine Red (with an addition of some stannic oxide paste and acetate of lime) washed, steamed for 1 hour, soaped slightly, washed again and dried.

Discharge Print.

If white styles are to be discharged on the alumina mordanted cloth, then print on the following discharge before hanging the material in the ager.

Discharge.

2 gallons	or	712 grms.	lemon juice 48° Tw.
10 lbs.	»	288 »	burnt starch
		1000 grms.	

Dunging liquor same as on page 88.

For some colours, such as Celestine Blue B, Gallo Cyanine, Alizarine Cyanine Black G, cloth discharged with the above discharge, is treated with 3% tannic acid, rinsed and finally dyed at the boil.

b) Dyeing of material previously figure printed.

Print on cotton cloth the following:

Red Paste.

Boil:

3 1/3 pints	or 763 cc.		sulpho-acetate of alumina 12° Tw.
17 oz.	» 169 grms.		flour
4 1/4 »	» 42	»	dark burnt starch
1/5 noggin	» 12	»	Persian berry extract 12° Tw. and
1/15 »	» 4	»	olive oil

Before printing add to

4 1/3 pints or 960 ccm. of the above print paste:

1/5 »	» 45 cc.	tin cryst. solution 82° Tw.	5 oz. or 51 grms. tin cryst. 1 nogg. » 60 cc. pure pyroligneous acid 3° Tw.
1 noggin	or 60 grms.	soda solution 30° Tw.	2 oz. or 19 grms. soda ash 98% 1 1/4 nogg. or 75 ccm. water

After printing and dyeing proceed in the same way as mentioned on page 86 for dyeing plain shades on piece goods.

According to the amount of white in the pattern less colour should of course be taken than when dyeing plain shades. For a print paste for Pink shades the above Red Printing Paste is reduced with 5—10 parts thickening.

Dunging liquor for alumina mordant.

1. Box. 950	gallons	or 4200	litres	water 165° Faht.
8 1/4	»	» 37 1/2	kilos	silicate of soda solution 32° Tw.
8 1/2 lbs.	»	3 3/4	»	whitening
2. Box. 650	gallons	or 2900	litres	water 165° Faht.,
5 1/2	»	» 25	kilos	silicate of soda solution 32° Tw.,
5 1/4 lbs.	»	2 1/2	»	whitening.

3. Box. 600	gallons or 2600	litres	water 185° Faht.
43	» » 196	»	cow dung standard solution
4. Box. 300	gallons or 1300	litres	water 185° Faht.
25	» » 112	»	cow dung standard solution

The duration of the passage through the four boxes is three mins.

Standard Cow Dung Solution.

Boil:

80 gallons or 800 litres cow dung
60 » » 600 » water
70 lbs. » 70 kilos whitening

} for 2 hours, and then make up with water to 140 gallons or 14 000 litres.

After passing the pieces full width through the dunging liquor, wash, and run them in the rope state through three vats at 185° Faht. each containing 165 gallons water and 29 gallons of standard cow dung solution. Then wash, and dye.

Printing.

Directions for Printing with Mordant colours and alumina Mordants.

Alizarine Red.

Mix:

6 3/4 pints	or 150 grms.	**Alizarine Red** 20%	
3 1/4 galls.	» 630 »	acetic acid starch tragacanth thickening (R)	
4 1/2 pints	» 100 »	sulpho cyanide of alumina 18° Tw.	
3 1/4 »	» 75 »	acetate of lime 23° Tw.	
1 1/8 »	» 25 »	olive oil and	
10/11 pint	» 20 »	oxalate of tin 25° Tw.	
	1000 grms.		

Alizarine Pink.

Mix:

5 1/2 noggs.	or 30 grms.	**Alizarine Red IP** 20%	
5 1/8 galls.	» 913 »	acetic acid starch tragacanth thickening (R)	
2 3/4 noggs.	» 15 »	olive oil	
4	» » 24 »	sulpho cyanide of alumina 18° Tw.	
2	» » 12 »	acetate of lime 23° Tw.	
1	» » 6 »	oxalate of tin 25° Tw.	
	1000 grms.		

Alizarine Orange.

Mix:

1 1/16 pints	or 150 grms.	**Alizarine Orange** 20 %	
3 3/4 »	» 550 »	acetic acid starch tragacanth thickening (R)	
4 noggs.	» 200 »	acetate of alumina 15° Tw.	
1 noggin	» 50 »	acetic acid 9° Tw. (30%) and	
1 »	» 50 »	acetate of lime, 15° Tw.	
	1000 grms.		

Alizarine Cyanine R.

Mix:

9 noggs.	or 200 grms.	**Alizarine Cyanine R paste**	
28 1/2 »	» 625 »	acetic acid starch tragacanth thickening (R)	
6 3/4 »	» 145 »	acetate of alumina* 18° Tw.	
1 3/8 »	» 30 »	acetic acid 9° Tw. (30%)	
	1000 grms.		

Mix the respective mordant colour, thickening and mordants cold. Print on unoiled or oiled cotton cloth (1 part Turkey Red oil and 15—20 parts water), steam for 1 hour with 7 1/2 lbs. pressure, chalk (8 oz. whitening per gallon water), wash, soap for 20 mins. at 140—158° Fahr., and for Reds add, if necessary, a small amount of tin crystals-soda, wash, and chlore if necessary at 1/4—1° Tw.

The Violet shade produced with Alizarine Cyanine R stands soaping only up to 85° Fahr.

* Remarks: Instead of acetate of alumina 6 3/4 noggins or 150 grms. nitrate of alumina 23° Tw. and 2 1/4 noggins or 50 grms. acetate of lime 23° Tw. can sometimes be employed.

b) On Cotton Yarn.

The cotton yarn must be boiled well before printing, but neither this process nor the bleaching should be too severe, as the colour runs on yarns which have been bleached or scoured too much. Before printing the well dried yarns must be opened out uniformly, so that each thread can be printed. After printing dry quickly, in order to prevent any evaporation of the colour. Steam for 1 hour with or without pressure, according to the colour employed. The printed yarns

are generally woven immediately they are steamed and not previously washed. If the yarns are to be washed, then it is advisable to chalk them first, wash, soap according to requirements, (the same as with piece goods) wash and dry. When soaping pink shades printed with Alizarine Red it is best to add to the bath a slight amount of tin crystals-soda, as a better white thereby results.

Remarks. The colour is generally printed on unoiled yarn. Alizarine Red Pink, however, produces a finer shade on oiled yarn, (1 part Turkey-Red-oil to 30 parts water).

Alizarine Red.

3 1/2	noggs. or	70	grms.	**Alizarine Red** 20%
27 1/2	»	550	»	acetic acid starch tragacanth thickening (F)
15	»	293	»	water
3 1/2	»	70	»	acetate of alumina 18° Tw.
5/8	»	12	»	acetate of lime 23° Tw.
1/4	»	5	»	oxalate of tin 25° Tw.
		1000	grms.	

Alizarine Red SX extra, IIAGP, XGP in paste, etc. are especially suited for the above.

Alizarine Pink.

1/4	nogg. or	15	grms.	**Alizarine Red I extra** or **I P** 20%
3 1/4	pints	640	»	acetic acid starch tragacanth thickening (R)
1 3/4	»	320	»	water
1/4	nogg.	18	»	acetate of alumina 18° Tw.
1/16	»	4	»	acetate of lime 23° Tw.
1/16	»	3	»	oxalate of tin 25° Tw.
		1000	grms.	

Of the alumina mordant dyestuffs Alizarine Orange G paste, Alizarine Bordeaux BP paste, etc. are also used for cotton yarn printing.

45. **Mordant** colours, which are adapted for **dyeing cotton mordanted** with **chrome** as well as for **printing cotton** with **chrome mordant:**

Reds: *Brilliant Chrome Red in paste
*Chrome Red R in paste and in powder

These products marked with * are best adapted for printing.

Reds: Eosine S extra bluish, yellowish
Rhodamine B, G, S (Turkey Red Oil)

Oranges: Alizarine Yellow R in paste and in powder
*Diamond Orange in paste

Yellows: Alizarine Yellow 3 G in powder, G G in paste
Anthracene Yellow in paste, C in powder
Chrome Yellow in paste, D, G in powder, R extra in paste and in powder
Diamond Flavine G in paste
Diamond Yellow G in paste

Greens: *Alizarine Viridine F F in paste and in powder, D G in paste
*Azo Green in paste
*Chrome Green in powder (on adding Turkey-Red-Oil)
Coeruleine in paste and in powder, S* and S W in paste

Blues: Alizarine Blue G G double, G W double, R double and B M single in paste, S*, S extra*, S R*, S R extra* in paste and in powder, S W in powder
Alizarine Cyanine G G and R in paste and in powder
Alizarine Sapphirole B, F B S, S E in powder and in paste*, C in powder
Brilliant Alizarine Blue G and R in paste and in powder, S P* in powder (on adding acetic acid and Turkey-Red-Oil)
*Chrome Blue in paste (on adding Turkey-Red-Oil)
Celestine Blue B in powder
Gallamine Blue in paste
Gallo Cyanine in paste and in powder
New Victoria Blue B (on adding Turkey-Red-Oil)
Victoria Blue B (on adding Turkey-Red-Oil)

Violets: Alizarine Bordeaux B in paste and in powder B P*, B B P* in paste
Alizarine Heliotrope R in paste
Chrome Violet in paste (on adding acetate of ammonia)

Those products marked with * are best adapted for printing.

Violets: Gallëine in paste
Browns: Alizarine Orange G, GG, RP* in paste, R in paste and in powder
Alizarine Purpurine in paste
Alizarine Red I extra*, IP*, IIAB, IIB, IIA, IIAG, IIAGP*, IG, IGG, IIGG, WRB, SX extra*, SX extra new*, SX, V, VP*, RIVP*, RA, RAN, RAG, X, XP*, XG, XGP* in paste
Alizarine Bordeaux G, GP*, GGP* in paste
Anthracene Brown G, R in paste and in powder, GG, RP*, K, W in paste
*Chrome Rubine in powder and in paste
Diamond Brown in paste
Greys: Alizarine Blue Black B, 3B in paste and in powder
Alizarine Cyanine Black G in paste and in powder
Alizarine Fast Grey in paste and in powder, BG in paste
Blacks: Alizarine Blue Black B, 3B in paste and in powder
Alizarine Cyanine Black G in paste and in powder
Alizarine Fast Grey in paste and in powder, BG in paste

Recipe for Dyeing.

Cotton Piece Goods.

a) Chroming.

A. Pad the cotton cloth in the slop-padding machine with an alkaline acetate of chrome solution (Chrome slop-padding liquor No. 1), allow the slop-padded material to remain in the rolled up state for 6—8 hours, then wash and dye with mordant colours as stated under c).

B). Another way is to slop-pad the cotton material with bisulphite of chrome solution either with or without thickenings (Chrome slop-padding liquor No. II), dry in the hot flue, steam, if necessary in the Mather & Platt, or either before or after steaming pass through an

Those produc s marked with * are most adapted for printing.

alkaline bath (e. g. 4 1/2 oz. soda ash or silicate of soda, etc. per 10 gallons water 140° Faht.), then wash and dye with mordant colours as stated under c).

Chrome slop-pad liquor No. I.

Mix:

5	pints	or 960 grms.		acetate of chrome 32° Tw.
1 1/2	gallon	» 2570	»	soda lye 66° Tw.
13/16	noggs.	» 40	»	glycerine 48° Tw.
5	gallon	» 6430	»	water
		10000 grms.		

Chrome slod-pad liquor No. II.

Mix:

6	pints	or 6	litres	bisulphite of chrome 32° Tw.
12	»	» 12	»	mucilage of tragacanth 65 : 1000
82	»	» 82	»	water
		100	litres.	

b) Discharging of chrome slop-padded cotton material.

After drying print the chrome slop-padded cotton cloth (see under a) with discharge paste, containing citric acid and sometimes also tartaric acid, steam in the Mather & Platt in order to discharge the chrome mordant in certain places, whereby in dyeing, white figures are obtained on a coloured bottom.

Discharge paste.

Mix:

26 3/4	oz	or 268	grms.	burnt farina
2 1/2	pints	» 427	»	water
18 1/2	oz.	» 183	»	citric acid powder
12 1/4	»	» 122	»	tartaric acid powder
		1000	grms.	

c) Dyeing of chromed cotton.

Dissolve the mordant colour well in water, and pour same into the dye bath through a sieve, then add about 2% acetic acid, dye for 3/4 hour, beginning cold and gradually bringing up to the boil, continue dyeing at this temperature for 1/2—1 hour, then wash well, and should the goods contain a white discharge pass through either a weaker or strong soap bath, wash again and dry; if necessary chlore with a weak or strong solution.

Yarn.

a) Chroming of the cotton yarn.

The cotton yarn, which has been previously cleaned by boiling for 3 hours in a 3% soda ash solution and rinsed, is hydroextracted, steeped over night in chloride of chrome solution 15—32° Tw. then wrung out and rinsed. Before mordanting with chloride of chrome it is advantageous to oil the cotton (1 part Turkey Red oil, 10—20 parts water), or to sumac (2½ lbs. sumac extract 20% per 10 gallons liquor), or pass through a bath prepared with tannic acid (8 oz. tannic acid per 10 gallons of liquor).

Remarks: Instead of chloride of lime, bisulphite of chrome 15—32° Tw. or chromate of chromic acid 18° Tw. is sometimes also employed for cotton yarn, the same as for piece goods.

b) Dyeing of the chromed cotton yarn.

Dye the chrome cotton for ½ hour cold with the respective mordant colour, then for 1 hour at a temperature of 140—190° Faht. (if necessary with an addition of some acetic acid or acetate of ammonia, sometimes also with a little tannic acid) wash and dry, steam, chalk, wash for 20 mins. at 120° Faht., soap, wash and dry. If the yarn is not to be steamed then the colour is fixed by boiling for 1—1½ hours. Occasionally a small quantity of acetate of lime (about one fifth of the quantity of colour taken) is added to the dye bath.

Recipe for Printing.

a) On Cotton Cloth.

General recipe for printing chrome mordant colours.

3 oz.	or 30 grms.	**Chrome Mordant Colour powder**	
		or { 15 oz. or 150 grms. paste 20%	
		{ 2½ noggs. „ 120 „ water	
1¼ pints	» 240 »	water	
3 »	» 650 »	acetic acid starch tragacanth thickening (F)	
1½ noggs.	» 80 »	acetate of chrome 32° Tw.	
	1000 grms.		

Print on cotton cloth, either oiled with Turkey Red oil (1—20 parts water) or on unoiled material, steam for 1 hour, chalk for 1 min. at 165° Fahr. with 1 lb. whitening per 10 gallons water, wash, malt for ½ hour at 100—120° Fahr. with 1 lb. roughly ground malt per 10 gallons water, soap for 20 mins. at 85—120—165° Fahr. with 3—5 oz. olive oil soap per 10 gallons water, wash and dry.

The recipe given on page 80, under No. 42 for padding Alizarine Bordeaux BP also holds good for padding mordant colours in the slop-padding machine. The quantity of ammonia stated in the recipe for dissolving the colour is not necessary for all colours, many do not even require any addition whatever for padding.

b) on cotton yarn.

Mordant colours specially adapted for **cotton yarn printing** with acetate of chrome:

Reds: Brilliant Chrome Red paste
Chrome Red R paste
Eosine S extra bluish, S extra yellowish

Oranges: Alizarine Yellow R paste
Diamond Orange paste

Yellows: Alizarine Yellow 3 G powder, G G paste
Anthracene Yellow paste, C powder
Chrome Yellow paste
Diamond Yellow G paste

Greens: Alizarine Viridine F F paste and powder
Azo Green paste
Chrome Green powder
Coeruleine S paste

Blues: Alizarine Blue S, S extra, SR, SR extra paste and powder
Alizarine Cyanine R, G paste
Brilliant Alizarine Blue G, R paste
Brilliant Alizarine Blue SP
Chrome Blue paste
Celestine Blue B
Gallamine Blue paste

Violets: Alizarine Bordeaux B P paste
Chrome Violet paste
Galleine paste
Gallo Cyanine paste

Browns: Alizarine Orange G, R, RP paste
Alizarine Red I extra, IP, SX extra, SX extra new paste
Anthracene Brown G, GG, K, R, RP paste
Diamond Brown G paste

Blacks: Alizarine Blue Black B, 3 B paste
Alizarine Cyanine Black G paste
Alizarine Fast Grey paste
Alizarine Grey SP

General recipe for chrome mordant colours.

7 1/2 noggs.	or 150 grms.	**Chrome mordant colour paste**	
		or { 30 grms. or 1 1/2 noggs.	powder
		{ 120 " " 6 "	water
3 3/4 "	" 75 grms.		acetic acid starch tragacanth thickening (F)
2 pints 3/4 nogg.	" 175 "		mucilage of tragacanth 65 : 1000
5 1/2 "	" 440 "		water
1 1/4 "	" 100 "		acetic acid 9° Tw. (30%)
3 noggs.	" 60 "		acetate of chrome 32° Tw.
	1000 grms.		

Alizarine Blue (Light & Dark Shades).

1—4 noggs. or	50—200 grms.	**Alizarine Blue S paste**	
1 1/2 "	" 75—75 "		starch tragacanth thickening (K)
4—3 1/2 "	" 200—175 "		mucilage of tragacanth 65 : 1000
3 1/2—2 1/2 pints	" 660—500 "		water
3/10—1 nogg.	" 15—50 "		acetate of chrome 32° Tw.
	1000 grms.		

Work in the same manner as described on page 95.

Recipe for Padding one side.

2 1/4 noggs. or	12 grms.	**Alizarine Red SX extra 20%**	
5 pints	" 100 "		mucilage of tragacanth 65 : 1000
42 "	" 830 "		water
2 1/2 "	" 50 "		acetic acid 9° Tw. (30%)
1 1/2 noggs.	" 8 "		acetate of chrome 32° Tw.
	1000 grms.		

46. **Mordant** colours, which are adapted for **dyeing cotton mordanted** with **iron** as well as for **printing cotton** with an **iron mordant:**

Blues: Alizarine Blue 3 R X double paste and powder
Violets: Alizarine Red I extra and I P in paste
Greys: Alizarine Grey S P paste

Recipe for dyeing.

a) Plain Shades (Yarn and Piece goods).

After the goods have been boiled for 3 hours with 3% soda ash, mordant with pyrolignate of iron 6—12° Tw., then rinse and hydroextract or slop-pad (if necessary previously treat in an olive oil emulsion) and dry. When padding on one side employ about:

1 pint or 100 grms. pyrolignate of iron 12° Tw.
9 » » 900 » burnt starch thickening 330 : 1000
1000 grms.

Allow the yarn or pieces to oxidise in the ager at a moist and warm temperature, treat in an alkaline bath of soda and silicate of soda or chalk (½—1 lb. per 10 gallons) at 160° Faht., wash and then dye with the respective mordant colour for 1½ hours, starting cold and bringing up to the boil, wash, dry, steam for 1 hour, soap, wash and dry.

If discharge styles are to be produced on plain shades, then this can be done after slop-padding and drying, by printing on thickened bisulphate of soda, citric acid or lemon juice, e. g.

7 pints or 700 grms. citric acid 48° Tw. thickened with
3 » » 300 » burnt starch
1000 grms.

The further process is the same as stated above.

b) Styles printed locally. (Prints on piece goods).

Print for instance

½ pint or 50 ccm. pyrolignate of iron 15° Tw.
10 » » 1000 » acetic acid starch solution containing light burnt starch (350 : 1000)

on bleached cotton cloth, oxidise for 2 days in the ager at a moist and warm temperature, cow dung full width (same as stated for Turkey Red under No. 44

page 86) but only at 140° Faht., then cow dung in the rope state for 20 mins. at 140° Faht. in the vat containing

5 lbs. or 6 kilos solution of sodium arseniate 15° Tw.
1/4 » » 250 grms. chalk
2 galls. » 20 litres cow dung

per 80 gallons or 800 litres water respectively, wash, dye with the addition of mordant colour for 1/2 hour up to 165° Faht. and another 1/2 hour at 165° Faht. (e. g. with a bluish Alizarine Red a violet is obtained on an iron mordant). Basic colour (e. g. Methyl Violet with Alizarine Reds) gum solution, sumach, etc. can be added to the dye bath.

e. g. **Recipe for printing.**

Mix up:

2 1/4 noggs.	or	120 grms.	**Alizarine Red I extra 20%**
3 1/2 pints	»	700 »	acetic acid starch tragacanth thickening (F)
3/4 nogg.	»	40 »	nitrate of iron 32° Tw. and
2 1/2 noggs.	»	140 »	acetate of lime 23° Tw.
		1000 grms.	

Print on unoiled cotton cloth, steam for 1 hour without pressure, chalk, malt, soap for 20 mins. at 85° Faht. and if necessary chlore slightly.

N. B. Instead of nitrate of iron, acetate of iron or yellow prussiate of potash can also be employed.

47. **Mordant** colours which are adapted for **cotton printing** with a **zinc** or **nickel mordant:**

Blues: Alizarine Blue S, S extra, SR, SR extra paste and powder

Greys: Alizarine Grey SP paste

Directions for Printing.

1 nogg.	or	50 grms.	**Alizarine Blue S extra paste**
1/2 gall.	»	800 »	starch tragacanth thickening (K), to which add
1 6/8 oz.	»	15 »	sulphate of zinc dissolved in
2 3/4 noggs.	»	135 »	water
		1000 grms.	

1	nogg.	or 50 grms.	**Alizarine Blue S extra paste**
3 1/2	pints	» 700 »	starch tragacanth thickening (K)
			to which add
3/16	nogg.	» 10 »	acetate of nickel 15° Tw.
1 1/4	pints	» 240 »	water.
		1000 grms.	

Print on unoiled cotton cloth, steam for 1 hour without pressure, chalk, malt and soap 10 mins. at 85° Faht. (Instead of sulphate of zinc acetate of zinc can be employed).

48. **Mordant** colours, which when **dyed** or **printed** on **cotton** are remarkably **fast to light:**

Reds: Alizarine Red I extra, IP, IIAB, IIB, IIA, IIAG, IIAGP, IG, IGG, IIGG, SX extra, SX extra new, SX, V, VP, RIVP, RA, RAN, RAG, X, XP, XG, XGP in paste (alumina)

Oranges: Fast Printing Yellow R in paste and in powder (Chrome)
Alizarine Orange G, GG, RP in paste, R in paste and in powder (alumina)

Yellows: Alizarine Yellow GG paste (Chrome)
Anthracene Yellow in paste (Chrome)
Diamond Flavine G in paste (Chrome)
Diamond Yellow G in paste (Chrome)

Greens: Alizarine Green DG in paste, V in powder and in paste (Chrome)
Alizarine Green in paste and in powder, S and SW in paste (Chrome)

Blues: Alizarine Blue A in paste and in powder (Chrome)
Alizarine Blue SAP, SAE, SAF in paste and in powder, SAC in powder (Chrome)
Alizarine Blue SAP in paste and in powder (alumina)
Alizarine Blue BAG and BAR in paste and in powder, SP in powder (Chrome)
Celestine Blue B (Chrome)
Gallamine Blue in paste (Chrome)

Violets: Alizarine BX in paste and in powder, BXP in paste (Chrome)
Alizarine Red I extra, IP in paste (iron)

Browns: Alizarine BX in paste and in powder, GX, GGX, BXP, GXP, GGXP, in paste (alumina)
Alizarine Orange G, GG, RP, in paste, R in paste and in powder (Chrome)
Alizarine Red in paste (all brands, please refer to Red) (Chrome)
Anthracene Brown G, R in paste and in powder, GG, RP, K, W in paste (chrome)

Greys: Alizarine Black B, 3 B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Grey in paste and in powder, BG in paste (Chrome)

Blacks: Alizarine Black B, 3 B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Grey in paste and in powder, BG in paste (Chrome)

49. **Mordant colours,** which when **dyed** or **printed** on **cotton** are **fast to alkali** resisting **20% ammonia:**

Reds: Alizarine Purpurine in paste (alumina)
Alizarine Red I extra, IP, IIAB, IIB, IIA, IIAG, IIAGP, IG, IGG, IIGG, SX extra, SX extra new, SX, V, VP, RIVP, RA, RAN, RAG, X, XP, XG, XGP, in paste (alumina)
Rhodamine B, G, S (Chrome)

Oranges: Fast Printing Yellow R in powder and in paste, (Chrome)
Alizarine Orange G, GG, RP in paste, R in paste and in powder (alumina)
Diamond Orange in paste (Chrome)

Yellows: Fast Printing Yellow 3 G in powder (Chrome)
Anthracene Yellow in paste (Chrome)
Chrome Yellow G in powder (Chrome)
Diamond Yellow G in paste Chrome)

Greens: Alizarine Green DG in paste, V in paste and in powder (Chrome)

Alizarine Green in paste and in powder, S and SW in paste (Chrome)

Blues: Alizarine Blue GG double, GW double, R double and BM single in paste, S, S extra, SR, SR extra, SW in paste and in powder (Chrome)

Alizarine Blue HJ, B in paste and in powder (Chrome)

Alizarine Blue BAG and BAR in paste and in powder, SP in powder (Chrome)

Chrome Blue in paste (Chrome)

Celestine Blue B (Chrome)

Gallamine Blue in paste (Chrome)

Gallo Cyanine in paste and in powder (Chrome)

New Victoria Blue B (Chrome)

Violets: Alizarine BX in paste and in powder, BXP in paste (chrome)

Alizarine Blue B in paste and in powder (alumina)

Alizarine Blue HR in paste (Chrome)

Alizarine Red I extra, IP in paste (iron)

Galleine in paste (Chrome)

Browns: Alizarine BX in paste and in powder, GX, GGX, BXP, GXP, GGXP in paste (alumina)

Alizarine Orange G, GG, RP in paste, R in paste and in powder (Chrome)

Alizarine Purpurine in paste (Chrome)

Alizarine Red in paste (all brands, please refer to Red) (Chrome)

Anthracene Brown G, R in paste and in powder, GG, RP, W in paste (Chrome)

Anthracene Brown G, R in paste and in powder, GG, K, RP, W in paste (alumina)

Greys: Alizarine Black IA in paste and in powder (Chrome)

Alizarine Black 3B in paste an in powder

Alizarine Fast Grey in paste and in powder, BG in paste (Chrome)

Blacks: Alizarine Black B, 3B in paste and in powder (Chrome)

Blacks: Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Grey in paste and in powder, BG in paste (Chrome)

50. **Mordant colours,** which when **dyed** or **printed** on **cotton** are **fast to acid** (viz.: **acetic acid** of 9° Tw.):

Reds: Alizarine Purpurine in paste (alumina)
Alizarine Red I extra, IP, IIAB, IIB, IIA, IIAG, IIAGP, IG, IGG, IIGG, WRB, SX extra, SX extra new, SX, V, VP, RIVP, RA, RAN, RAG, X, XP, XG, XGP in paste (alumina)
Brilliant Chrome Red in paste (Chrome)
Chrome Red R in paste and in pwdr. (Chrome)
Eosine S extra bluish (Chrome)
Rhodamine B, G, S (Chrome)

Oranges: Alizarine Orange G, GG, RP in paste R in paste and in powder (alumina)

Yellows: Alizarine Yellow GG paste (Chrome)
Anthracene Yellow in paste (Chrome)
Chrome Yellow R extra in paste and in powder (Chrome)

Greens: Alizarine Green V in paste and in powder DG in paste (Chrome)
Azo Green in paste (Chrome)
Alizarine Green in paste and in powder, S and SW in paste (Chrome)

Blues: Alkali Blue 3 B (Chrome)
Alizarine Blue S, S extra, SR, SR extra, SW in paste and in powder, GG double, GW double, R double and BM in paste (Chrome)
Alizarine Blue D, HJ in paste and in powder (Chrome)
Alizarine Blue SAE in paste and in powder (Chrome)
Alizarine Blue BAG and BAR in paste and in powder, SP in powder (Chrome)
Chrome Blue in paste (Chrome)
Gallamine Blue in paste (Chrome)
Gallo Cyanine in paste and in powder (Chrome)

Blues: New Victoria Blue B (Chrome)
Victoria Blue B (Chrome)

Violets: Alizarine BX in paste and in powder, BXP in paste (Chrome)
Alizarine Blue B in paste and in powder (alumina)
Alizarine Blue HR in paste (Chrome)
Alizarine Red I extra, IP in paste (iron)
Chrome Violet in paste (Chrome)
Gallëine in paste (Chrome)
Chrome Rubine in paste and in powder (Chrome)

Browns: Alizarine BX in paste and in powder, GX, GGX, BXP, GXP, GGXP in paste (alumina)
Alizarine Orange G, GG, RP, in paste, R in paste and in powder (Chrome)
Alizarine Purpurine in paste (Chrome)
Alizarine Red in paste (all brands, please refer to Red) (Chrome)
Anthracene Brown G, R in paste and in powder, GG, RP, K, W in paste (Chrome) (alumina)

Greys: Alizarine Black B, 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Grey in paste and in powder, BG in paste (Chrome)

Blacks: Alizarine Black B, 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Grey in paste and in powder, BG in paste (Chrome)

51. **Mordant colours,** which when **dyed** or **printed** on **cotton** are very **fast to washing:**

Reds: Alizarine Red I extra, IP, IIAB, IIB, IIA, IIAG, IIAGP, IG, IGG, IIGG, WRB, SX extra, SX extra new in paste (alumina)

Oranges: Alizarine Orange G, GG, RP in paste, R in paste and in powder (alumina)

Yellows: Alizarine Yellow GG in paste (Chrome)
Greens: Alizarine Green in paste and in powder, S, SW in paste (Chrome)
Blues: Alizarine Blue S, S extra, SR, SR extra and SW in paste and in powder, GG double, GW double, R double and BM single in paste (Chrome)
Alizarine Blue B in paste and in pwdr. (Chrome)
Alizarine Blue BAG, BAR in paste and in powder (Chrome)
Violets: Alizarine BX in paste and in powder, GX, GGX, BXP, GXP, GGXP in paste (Chrome)
Alizarine Red I extra, IP in paste (iron)
Gallëine in paste (Chrome)
Browns: Alizarine BX in paste and in powder, GX, GGX, BXP, GXP, GGXP in paste, (alumina)
Alizarine Orange G, GG, RP in paste, R in paste and in powder (Chrome)
Alizarine Red in paste (all brands, please refer to Red) (Chrome)
Anthracene Brown G, R, in paste and in powder, GG, W, K in paste (Chrome)
Greys: Alizarine Black B, 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Grey in paste and in powder, BG paste (Chrome)
Blacks: Alizarine Black B, 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Grey in paste and in powder, BG in paste (Chrome)

52. **Mordant colours** which when **dyed** or **printed** on **cotton** are **fast to chlorine:**

Reds: Alizarine Red I extra, IP, IIAB, IIB, IIA, IIAG, IIAGP, IG, IGG, IIGG, WRB, SX extra, SX extra new in paste (alumina)
Oranges: Alizarine Orange G, GG, RP in paste, R in paste and in powder (alumina)

Blues: Alizarine Blue S, S extra, SR, SR extra in paste and in powder, BM single, GG double, GW double and R double in paste (Chrome)

Browns: Alizarine Orange G, GG, RP in paste, R in paste and in powder (Chrome)

Alizarine Red in paste (refer to the brands under Reds) (Chrome)

53. **Mordant colours** which when **dyed** on mordanted **cotton yarns** are chiefly employed for **fancy woven goods:**

Reds: Alizarine Red I extra, IIAB, IIB, IIA, IIAG, SX extra, SX extra new, SX in paste (alumina)

Blues: Alizarine Blue S, S extra, SR, SR extra and SW in paste and in powder, GW double, GG double and R double, BM single in paste (Chrome)

Violets: Alizarine Red I extra in paste (iron)

Browns: Alizarine BX in paste and in powder, GX, GGX in paste (alumina)

54. **Mordant colours** which when **dyed** on an **alumina mordant (on cotton)** are **dichargeable** with **caustic soda, silicate of soda** and **tin crystals:**

Reds: Alizarine Purpurine in paste (middling)
Alizarine Red IIGG, WRB, SX extra, X in paste (easily)

Violets: Alizarine Blue 3RX double in paste and in powder (middling)
Alizarine Blue B in paste and in powder (middling)

Mordant the cotton material with alumina, dye, oil, steam, soap, wash, dry, (See recipe under No. 43, page 84) and then print with:

Warm up: **White Discharge.**

8 1/2 pints	or	520 grms.	of a clear solution of caustic soda 106° Tw. and
4 1/2 »	»	190 »	gum water 1 : 1. When cold add in small portions within 4 hours, under external cooling,
2 lbs.	»	65 »	tin crystals, then
3 3/4 pints	»	202 »	silicate of soda 71° Tw.
1/2 pint	»	23 »	glycerine 48° Tw.
		1000 grms.	

Strain the discharge white twice, steam for 1 ½—3 mins., and pass through boiling silicate of soda and boiling water in four consecutive becks, the first two containing each 1 ½ noggins silicate of soda 64° Tw. for 12 ½ gallons water, or 5 grms. per 1 litre, the last two containing boiling water only. For colour discharging, add plumbic chloride to the white discharge for a Yellow, and chrome afterwards with bichromate of potash solution to which hydrochloric acid has been added, and for a Blue discharge add Indigo, and for a Green a mixture of these Yellow and Blue preparations. For a Black, we recommend Aniline Black with a solution of vanadium.

55. **Mordant colours** which when **dyed** on **cotton** on an **alumina mordant** are **dischargeable** with **chloride of lime** and **arsenic acid:**

Reds: Alizarine Red I extra, IP, IIAB, IIB paste

Recipe for Discharging.

Pass the damp squeezed out cotton material, impregnated with stannate of soda 21 ½° Tw., through an alum bath 12° Tw., squeeze out again, wash, oil slightly, dry in the ager, then dye with the respective mordant colour, (e. g. with an Alizarine Red blue shade and sumac) for 1 hour at 165 Faht., wash, dry and then discharge with:

White Discharge:

Boil:

3 ½ lbs.	or	550 grms.	Wheat starch and	
4 ¼ galls.	»	6880	»	water, allow to cool down then add
6 ½ pints	»	2561	»	arsenic acid solution 178° Tw.
1 oz.	»	9	»	Prussian Blue
		10000 grms.		

Dry the printed goods, pass same for about ½ min. through a solution of bleaching powder 12° Tw. at 95° Faht., to which solution add for about 100 gallons, 20—30 lbs. caustic lime (slaked and minutely divided) so as to prevent the discharge swelling. After this process wash well.

N. B. The solution of bleaching powder should not be employed before the liquor has been allowed to stand and has become quite clear.

56. **Mordant colours** which when **dyed** or **printed** on **cotton (alumina mordant)** are **dischargeable** with **chlorate of soda, potassium ferricyanide,** etc. (oxidising agents):

Reds: Alizarine Purpurine in paste
Alizarine Red VP, X, XG, XP, XGP in paste

Oranges: Alizarine Orange G, GG, RP in paste,
R in paste and in powder (readily enough)

Blues: Alizarine Blue SAP in powder and in paste
Celestine Blue B

Violets: Alizarine Blue B in paste and in powder
Alizarine Blue HR in paste

Browns: Anthracene Brown G, R in paste and in powder, GG, W, K in paste
Alizarine BX in paste and in powder, BXP, GX, GXP, GGP and GGXP in paste

White Discharge.

Boil:	No. I.		No. II		
1 lb. 6½ oz	or 113 grms.	1 lb. 6½ oz.	or 113 grms.	Wheat Starch
3¾ pints	„ 371 „	3¾ pints	„ 371 „	mucilage of tragacanth 65 : 1000
3 „	„ 311 „	3 „	„ 295½ „	water and
12 oz.	„ 60 „	18 oz.	„ 90 „	chlorate of soda, and when luke warm add
1⅓ „	„ 7 „	2 „	„ 10½ „	red prussiate of potash powder and cold
4 noggs.	„ 138 „	6 noggs.	„ 207 „	citric acid solution 7½° Tw.
	1000 grms.		1000 grms.	

White discharge No. I for instance can be employed for discharging the colour on material padded as follows:

½ noggin	or 3 grms.	**Alizarine Bordeaux 20%**	
2¼ pints	» 50 »	thickening II	
1½ gallon	» 300 »	gum solution 1 : 1	
¾ noggin	» 4 »	tartrate of alumina 18° Tw.	
1 »	» 6 »	calcium sulphocyanide 23° Tw.	
¾ »	» 4 »	oxalate of tin 25° Tw.	
4 galls.	» 633 »	water	
	1000 grms.		

Steam for 1 hour wilh 7½ lbs. pressure, chalk and soap for 20 mins. at 120° Faht.

White Discharge No. II (See above) can be employed for instance for discharging alumina mordanted cotton dyed with 10% Anthracene Brown GG paste.

Steam for 1½ hour without pressure, wash and dry.

Colour Discharging.

Colour discharges on alumina mordanted cotton dyed with 10% Alizarine Blue B paste can be obtained for instance as follows:

Yellow Discharge.

Dissolve:

3 1/4 oz.	or 33 grms.	**Chloramine Yellow M**	in
3 1/4 noggs.	» 162 »	water, thicken with	
3 lbs. 14 oz.	» 620 „	starch tragacanth thickening (K) to which add	
3 1/2 noggs.	» 185 „	white discharge II (See page 104).	
	1000 grms.		

Steam for 1/2 hour without pressure, wash and dry.

57. **Mordant colours** which when **dyed** or **printed** on **cotton (chrome mordant)** can be **discharged** with **chlorate of soda, potassium ferricyanide,** etc. (oxidising agents):

Reds: Brilliant Chrome Red in paste
Chrome Red R in powder and in paste
Oranges: Fast Printing Yellow R (middling)
Yellows: Fast Printing Yellow 3G in powder
Alizarine Yellow GG paste
Chrome Yellow D in powder (middling)
Greens: Alizarine Green V in paste and in powder, DG in paste
Azo Green in paste
Alizarine Green in paste and in powder, S and SW in paste
Blues: Alizarine Blue S, S extra, SR, SR extra, SW in paste and in powder
Alizarine Blue BAG and BAR in paste and in powder, SP in powder
Alizarine Blue BRG, BR3G in paste and in powder
Celestine Blue B (moderately)
Gallamine Blue in paste
Violets: Alizarine BX in paste and in powder, BXP in paste
Alizarine Blue 3RX double in paste and in powder
Alizarine Blue HR in paste
Gallëine in paste
Gallo Cyanine in paste and in powder

Browns: Alizarine Purpurine in paste
Alizarine Orange G, GG, RP in paste, R in paste and in powder
Alizarine Red in paste
Anthracene Brown G, R in paste and in powder, GG, K, RP, W in paste

Greys: Alizarine Black B, 3B in paste and in powder
Alizarine Black IA in paste and in powder
Alizarine Fast Grey in paste and in powder

White Discharges.

White discharge C.

Boil:

2 lbs.	3 oz. or 350 grms.		British gum
12 1/2 oz.	» 125	»	chlorate of soda and
1 4/5 pint	» 365	»	water, when luke warm add
1 oz.	» 10	»	red prussiate of potash powder and
2 1/4 noggs.	» 150	»	citrate of soda 52° Tw.
	1000 grms.		

This white discharge can for instance be employed for discharging the following:

Slop padding Blue:

2 oz.	or	20 grms.		**Alizarine Blue S paste**
1 pint	»	200	»	water
1 1/2 »	»	100	»	mucilage of tragacanth 65 : 1000
2 7/8 »	»	575	»	water
1/8 nogg.	»	5	»	acetate of chrome 32° Tw.
1 1/2 pint	»	100	»	water
		1000 grms.		

Steam for 1 hour without pressure, soap for 10 minutes at 85° Faht., wash and dry.

Colour Discharging.

For colour discharges, print for instance the following discharge yellow on cloth slop-padded as above with Alizarine Blue:

Yellow Discharge.

Boil:			
3 1/4 oz.	or 33 grms.	**Chloramine Yellow M**
2 1/4 lbs.	» 350 »	British gum
12 oz.	» 125 »	chlorate of soda and
1 3/4 pints	» 332 »	water, when luke warm add
1 oz.	» 10 »	red prussiate of potash pwdr. and
2 1/4 noggs.	» 150 »	citrate of soda 52 1/2 ° Tw.
	1000 grms.	

Work in the same manner as stated above.

58. **Mordant colours** which when **dyed** or **printed** on **cotton (chrome mordant)** can be **discharged** with **tin crystals:**

Reds: Chrome Red R in paste and in powder
Oranges: Diamond Orange in paste
Yellows: Chrome Yellow in paste, D, G in powder, R extra in paste and in powder
Diamond Flavine G in paste
Diamond Yellow G in paste
Browns: Diamond Brown in paste

The white discharge II given under No. 23 can be taken for producing discharge effects on Benzidine colours, and should be employed in a more or less reduced state. Steam the pieces printed with it for 10 minutes or more, taking into consideration that the tin crystals contained in the discharge paste cause the fabric to become deteriorated by long steaming.

In most cases coloured effects and not white discharges are produced. Print for instance with:

3 1/2 pints	or 704 grms.	white discharge II (See No. 23)
1 1/4 noggs.	» 72 »	Persian Berry extract 52 ° Tw.
3/8 »	» 16 »	acetic acid 9 ° Tw. (30 %)
1/4 »	» 8 »	water
1 pint	» 200 »	thickening II
	1000 grms.	

and cover-print for instance with

3 3/8 pints	or 300 grms.	**Chrome Red paste**
7 »	» 620 »	acetic acid starch tragacanth thickening (F)
3 1/2 noggs.	» 80 »	acetate of chrome 32 ° Tw.
	1000 grms.	

Steam for 1/4 hour without pressure, wash and dry.

Persian Berry extract can be substituted by a Basic dyestuff, or Gallamine Blue, etc.

59. **Mordant colours** which when **dyed** on **chrome mordanted cotton** are adapted for **mercerised** goods:

Oranges: Diamond Orange in paste
Yellows: Fast Printing Yellow 3 G in powder
Fast Printing Yellow R in paste and in powder
Anthracene Yellow in paste
Chrome Yellow in paste
Diamond Flavine G in paste
Diamond Yellow G paste
Greens: Alizarine Green DG in paste, V in paste and in powder
Blues: Alizarine Blue BAG, BAR in paste and in powder
Chrome Blue paste
Celestine Blue B in powder
Violets: Alizarine BX in powder and in paste, BXP in paste
Chrome Violet in paste
Gallëine in paste
Browns: Alizarine Orange G, GG, RP in paste, R in paste and in powder
Blacks: Alizarine Black IA in paste and in powder
Alizarine Fast Grey paste and powder

The process for producing crepon effects on cloth dyed with chrome mordant colours see under No. 41 d, Page 75.

60. **Basic colours** which are adapted for the **dyeing** and **printing** of **cotton** (tannic acid mordant):

Reds: Brilliant Rhoduline Red B in powder, BD in paste
Diamond Fuchsine
New Magenta
Pyronine G
Rhodamine B, G, S, 4 G, 5 G
Rhoduline Red B and G in powder, GD in paste
Saffranine A, B extra, BB extra, FF extra,
Oranges: Chrysoïdine G, R in powder and in crystals
Coriphosphine O, OX, OX extra

Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
China Green Cryst.
Methyl Green cryst., I bluish, I yellowish, I extra bluish, 1 extra yellowish
Imperial Green GI, GII,
Emerald Green Cryst.
Blues: Cotton Blue I—VI, R, 2R, BSP
Blue 8336 (Navy Blue)
Brilliant Blue extra greenish
*Indigene F in paste
Night Blue extra greenish
Methylene Blue B, BB, R, RR
New Blue D Cryst., R extra*
New Fast Blue F, H*
Rhoduline Blue R, GG extra
Rhoduline Sky Blue BB
Turquoise Blue BB, G
Victoria Blue B
New Victoria Blue B
Violets: Methyl Violet 1R—5R, RB, 1B—7B
Brilliant Rhoduline Purple R
Rhoduline Violet
Rhoduline Heliotrope B, 3B
Browns: Bismarck Brown F, FF, M, R, R extra, LL extra
Greys: New Fast Grey
Blacks: Jute Coal Black S
Jute Black B

Those products marked with an asterisk are not adapted for direct steam printing, but only for dyeing purposes.

Directions for Dyeing.

The cotton cloth or yarn is first impregnated at 140—158° Fahr. in an aqueous tannic acid solution (4—6%, or for very dark shades up to 10%) or with a sumac decoction (30%—50% sumac of the weight of the goods) (5—6 lbs. sumac leaves equal about 4 lbs. sumac extract 25%). Sumac is employed more for dark shades, whereas tannic acid more for clear and pure shades.

Work the goods for 1—2 hours, or allow them to remain in the liquor over night, squeeze or wring out respectively, then enter the antimony bath without rinsing.

The cloth can also be slop-padded cold or warm once or several times in a bath containing 1—4 lbs. tannic acid per 10 gallons water, and then passed in the wet state or after previous drying, through a separate bath containing an antimony solution (with about 1—1½% tartar emetic or any other substitute). Yarns are treated for ½ hour in a cold tartar emetic bath, rinsed well and dyed warm, the same as for pieces, with Basic colours; if necessary with an addition of 1—2% acetic acid or 5% alum, beginning cold and raising the temperature as a rule only up to 120—140° Fahr. As Basic colours generally fall on quickly, the colour solution should only be added in small portions, so as to avoid uneven shades.

Remarks: Mordant the cotton only in wooden or stone vessels and never in iron becks, as iron with tannic acid produces black spots. For the same reason never let the material come into contact with iron. By after-treating with tannic acid (if necessary also with tartar emetic), the shades are rendered faster to washing.

Instead of 10 parts tartar emetic, other antimony salts are sometimes employed, such as 6½ parts double fluoride of antimony, or 5.9 parts Patent Salt (antimony annonium fluoride) (with an addition of some whitening), or 9 parts antimony salt, or as is recently done 10 parts Antimonine, the latter requiring an addition of some acetic acid. To neutralise the acids of the double fluoride of antimony salts some soda is often added, until the liquor becomes turbid.

When dyeing dark shades the above process is often altered in such a manner, that instead of the antimony salt the tannic acid is fixed with iron salts, chiefly with about 3% copperas or pyrolignate of iron 4½° Tw., then passed through a bath of whitening, or instead of this rinsed thoroughly, and finally dyed cold with Basic colour on the more or less light or dark grey tannic acid and iron mordant bottom.

Directions for Printing.

The following are employed as thickening agents for the print pastes, gum Arabic (usually dissolved 1 : 1) mucilage of tragacanth 65 : 1000, British gum water (600 : 1000) and wheat starch, the latter requiring as a rule a sufficient quantity of mucilage of tragacanth and a lot of acetic acid. Gum water is used for printing large designs. Wheat starch makes the print pastes darker than gum water does. Basic colours are dissolved in water and acetic acid, eventually with tartaric acid. To fix the colour, add to the print paste tannic acid dissolved in acetic acid, as a rule 3 parts tannic acid to 1 part colour.

a) General Recipe for Printing Basic Colours on Cotton Cloth.

Dissolve:

5 oz.	or	20 grms.		**Basic colour** in
1 1/4 pints	»	100	»	acetic acid 9° Tw. (30%) and
2 »	»	160	»	water, thicken with
6 »	»	600	»	acetic acid starch tragacanth thickening (A) or gum solution 1 : 1 and add
15 oz.	»	60	»	tannic acid dissolved in
2 1/2 noggs.	»	60	»	acetic acid 9° Tw. (30%)
		1000 grms.		

Print on cotton cloth oiled with Turkey Red oil (1 : 20 water) or on unoiled cloth, steam for 1 hour without pressure, pass through tartar emetic, 1 lb. per 10 gallons water, at 165° Faht. (with or without an addition of 1 3/4—3 oz. chalk per 10 galls.) wash, malt soap for 20 mins. at 85° Faht. wash, dry, chlore slightly or severly according to the resistance of the colour or state of the white discharge. Instead of tartar emetic, Antimonine is oftentimes now employed with some addition of acetic acid (2 pints per 125 gallons water). As to the double fluoride of antimony salts see preceding page.

b) **General Recipe for printing Basic Colours on Cotton Yarn.**

(Chiné prints.)

Dissolve:			
1 1/4—2 1/2 oz.	or	5—10 grms.	**Basic colour** in
1 15/16—1 7/8 pints	»	155—150 »	acetic acid 9° Tw. (30%) and
6 pints	»	580 „	water, thicken with
2 »	»	200 »	mucilage of tragacanth 65 : 1000 and add
2 1/2 noggins	»	60 »	acetic acid tannic acid solution 1 : 1
		1000 grms.	

Steam for 1 hour without pressure, if necessary pass through a bath of tartar emetic, 1 lb. per 10 gallons water at 120° Faht., wash or soap slightly for 5—10 mins. at 85° Faht., wash and dry. The steamed yarns are generally woven at once.

For the multi-coloured Donath machine the above thin print paste will suffice, but for one colour machines the print paste should be thicker.

61. **Basic colours** which when employed on a tannin mordant in dyeing or printing **cotton** are **very fast** to **light:**

Reds: Brillant Rhoduline Red B in powder, BD in paste
Rhoduline Red G in powder, GD in paste
Saffranine A, B extra, BB extra, FF extra,
Blues: Methylene Blue B, BB
New Fast Blue F, H
Rhoduline Blue R
Rhoduline Sky Blue BB
Violets: Rhoduline Heliotrope B, 3B

62. **Basic colours** which when dyed or printed on **cotton** (tannin mordant) are **fast to alkali** (a solution of 20% **ammonia**):

Reds: Brilliant Rhoduline Red B in powder, BD in paste
Pyronine G
Rhodamine B, G, S
Rhodamine 4G, 5G
Rhoduline Red B and G in powder, GD in paste

Reds: Saffranine A, B extra, BB extra, FF extra
Yellows: Auracine G
Auramine O, I, II, concentrated
Blues: Blue 8336
Methylene Blue BB
New Fast Blue F
New Victoria Blue B
Rhoduline Blue R, GG extra
Turquoise Blue BB, G
Victoria Blue B
Violets: Methyl Violet 7B—3R
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Greys: New Fast Grey

63. **Basic colours** which when dyed or printed on **cotton** (tannin mordant) are **fast to acid (acetic acid** 9° Tw.):

Reds: Brilliant Rhoduline Red B in powder, BD in paste
Diamond Fuchsine
New Magenta
Pyronine G
Rhodamine B, G, S
Rhodamine 4G, 5G
Rhoduline Red B and G in powder, GD in paste
Saffranine A, B extra, BB extra, FF extra
Oranges: Coriphosphine O, OX, OX extra
Chrysoidine G (almost good)
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Methyl Green G
Emerald Green Cryst.
Blues: Cotton Blue I—VI
Blue 8336
Methylene Blue BB
New Blue D
New Fast Blue F, H
New Victoria Blue B
Rhoduline Blue R, GG extra

Blues: Rhoduline Sky Blue BB
Turquoise Blue BB, G
Victoria Blue B
Violets: Brilliant Rhoduline Purple R
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Browns: Bismarck Brown F, FF, M, R, R extra, LL extra
Greys: New Fast Grey
Blacks: Jute Coal Black S
Jute Black B

64. **Basic colours** which when dyed or printed on **cotton** (tannin mordant) are rather **fast to chlorine:**
Blues: Methylene Blue BB

65. **Basic colours** which when dyed or printed on **cotton** (tannin mordant) are **fast to ironing** (i. e. their shade is unaltered by heat):
Reds: Brilliant Rhoduline Red B in powder and BD in paste
Rhodamine 4G, 5G (almost good)
Rhoduline Red B, G in powder, GD in paste
Saffranine A, B extra, BB extra, FF extra
Oranges: Coriphosphine O, OX, OX extra
Yellows: Auracine G
Greens: Brilliant Green cryst.
China Green cryst.
Cotton Green
Emerald Green cryst.
Blues: Cotton Blue I—VI, R
Blue 8336
Methylene Blue BB
New Fast Blue F, H
New Victoria Blue B
Night Blue extra greenish
Turquoise Blue BB, G
Victoria Blue B
Violets: Methyl Violet 5R—1R, 1B—7B
Rhoduline Violet
Browns: Bismarck Brown F, FF, LL extra, M, R, R extra
Greys: New Fast Grey

66. **Basic colours** which when **dyed** on **cotton** are chiefly employed for **fancy woven goods:**

Reds: Brilliant Rhoduline Red B in powder
Rhodamine B, G, S
Rhoduline Red B, G in powder
Saffranine A, B extra, BB extra, FF extra

Yellows: Auramine O, I, II, concentrated

Greens: Brilliant Green cryst.
Cotton Green

Blues: Indigene F in paste
Methylene Blue BB
New Fast Blue F, H
Rhoduline Sky Blue BB
Rhoduline Blue GG extra
Turquoise Blue BB, G

Violets: Methyl Violet
Rhoduline Violet

Greys: New Fast Grey

67. **Basic colours** which when dyed on **cotton** (on a tannin mordant) are **dischargeable** with **oxidising agents,** chlorates, red prussiate of potash etc.):

Reds: Diamond Fuchsine
New Magenta
Pyronine G (yellowish)
Rhodamine B, G, S

Yellows: Auracine G
Auramine O, I, II, concentrated

Greens: Brilliant Green cryst.
Cotton Green
Emerald Green cryst.
Methyl Green 191 (rather yellowish)
Turquoise Blue BB, G

Blues: New Fast Blue F (moderately good)
New Victoria Blue B
Rhoduline Sky Blue BB (chlorate of alumina)
Rhoduline Blue GG extra
Turquoise Blue BB, G
Victoria Blue B

Violets: Brilliant Rhoduline Purple R
Methyl Violet 1B—5R; 1B (the best)

Browns: Bismarck Brown M (rather yellowish), F, FF, LL extra, R, R extra (fairly)

Greys: New Fast Grey (only fairly)

White Discharge I.

Boil:

8 1/4	noggs.	or 426 grms.		chlorate of soda solution 76° Tw.
15 1/2	»	» 157	»	China clay
1 1/4	»	» 77	»	water and
19	oz.	» 192	»	British gum, when luke warm add
2	»	» 21	»	red prussiate of potash powder, and then when cold
4 1/4	»	» 42	»	citric acid dissolved in
1 2/3	noggs.	» 85	»	water
		1000 grms.		

Steam for 1/4 hour without pressure, wash and dry.

White Discharge II.

Boil:

22	oz.	or 113 grms.		wheat starch
3 1/4	pints	» 371	»	mucilage of tragacanth 65 : 1000
3	»	» 311	»	water and
12	oz.	» 60	»	chlorate of soda, when luke warm add
1 2/5	»	» 7	»	red prussiate of potash powder, and finally
1 1/2	pint	» 138	»	citric acid solution 7 1/2 Tw.
		1000 grms.		

Steam for 1/2 hour without pressure, chalk for 10 minutes at 120° Faht., wash, soap for 10 minutes at 120° Faht., wash and dry.

White Discharge III.

Stir up:

2 3/4	lbs.	or 220 grms.		British gum in
1/2	pint	» 50	»	water, to which add
4	pints	» 560	»	chlorate of alumina 42° Tw., warm slightly, and then when cold add
4	oz.	» 20	»	red prussiate of potash powder and
30	»	» 150	»	chlorate of soda
		1000 grms.		

Steam for 3 mins. without pressure, wash and dry.

Good results can also be obtained by mixing White Discharge I and III.

Recipe for Colour Discharging.

Mix:

4 1/2 pints or 450 grms. **Discharge Lake paste** (e. g. chromate of lead paste)
4 1/2 » » 450 » White discharge I (See preceding page)
1 » » 100 » egg albumen solution 2 : 1
1000 grms.

Steam for 1/4 hour without pressure.

Remarks: For Black, Fast Black can be used.

68. **Basic colours,** which when dyed with **oxydising agents** (chlorates, red prussiate of potash etc.) are **not dischargeable:**

Reds: Brilliant Rhoduline Red B
Rhoduline Red B, G
Rhodamine 4G, 5G
Saffranine A, B extra, BB extra, FF extra
Blues: Blue 8336 (Navy Blue)
Violets: Rhoduline Heliotrope B, 3B
Rhoduline Violet
Blacks: Jute Coal Black S
Jute Black B

69. **Basic colours,** which on employing zinc white, acetate of soda etc. are adapted for **discharges** or **resists** on **ferrocyanide of aniline black:**

Reds: Brilliant Rhoduline Red BD in paste
Rhoduline Red B in powder, GD in paste
Saffranine A, B extra, BB extra, FF extra
Oranges: Coriphosphine O, OX, OX extra
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green cryst.
Blues: Methylene Blue BB
Rhoduline Blue R
Turquoise Blue BB, G
Violets: Brilliant Rhoduline Purple R
Methyl Violet 1B—5R
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Browns: Bismarck Brown F, FF, M, R, R extra, LL extra

Recipe for Discharging.

1. Pad the cotton cloth with a ferrocyanide of aniline solution containing tannic acid, cover-print with Basic colour, to which as a discharge or resist acetate of soda has been added, steam for 5 mins. without pressure, (or run through the Mather & Platt) then pass through a bath of silicate of soda at 120° Faht. (1/2 lb. silicate of soda per 10 gallons water), wash and dry.

Slop-Pad Aniline Black I.

Dissolve:

10 oz.	or 39.8 grms.		Chlorate of soda in
2 pints	» 165.8	»	water, to which add
1 1/2 oz.	» 6.4	»	tannic acid dissolved in
1 nogg.	» 21.5	»	water, then add
7 1/2 oz.	» 29.8	»	yellow prussiate of potash dissolved in
2 1/2 pints	» 197	»	water, then
4 1/4 »	» 345	»	cold water
2 1/4 »	» 193.4	»	solution of hydrochloride of aniline
1/10 nogg.	» 1.3	»	vanadium solution 1 : 1000
	1000 grms.		

Hydrochloride Aniline Solution.

3 3/4 pints	or 300 grms.		Aniline oil
4 3/8 »	» 400	»	hydrochloric acid 26° Tw.
3 3/4 »	» 300	»	water
	1000 grms.		

General Recipe for Discharge Printing, I.

Dissolve:

2 1/2 oz.	or 10 grms.		**Basic colour** in
2 1/8 pints	» 175	»	acetic acid 9° Tw. (30%), thicken with
6 »	» 600	»	gum solution 1 : 1, add
10 oz.	» 40	»	tartar emetic powder, and finally
2 3/4 lbs.	» 175	»	acetate of soda
	1000 grms.		

2. Or another method is to slop-pad the cotton cloth with ferrocyanide of Aniline Black solution (without any tannic acid, Slop-Pad Aniline Black II, see next page) and cover-print with Basic colours, to which **zinc**

oxide (or carbonate of magnesia) together with acetate of soda is added as a discharge or resist agent, and employ albumen water to fix the colour. Steam for a short time without pressure (or in the Mather & Platt), run through silicate of soda, wash and dry.

The resists with zinc oxide can also be printed on first and then slop-padded with ferrocyanide of Aniline Black.

Slop pad Aniline Black II.

Dissolve:			
8 1/2 oz.	or 33.6 grms.		chlorate of soda in
3 1/2 pints	» 273	»	water, add
10 1/2 oz.	» 42	»	yellow prussiate of potash dissolved in
3 1/2 pints	» 273	»	water, and now add
2 7/10 nogg.	» 54	»	aniline oil dissolved in
2 1/2	» 52.6	»	hydrochloric acid 36° Tw. and
3 pints 1 1/2 noggs.	» 271.8	»	water
	1000 grms.		

General Discharge Printing Recipe II.

Dissolve:			
3 3/4 oz.	or 15 grms.		**Basic colour** in
1 1/2 pint	» 115	»	water and
3 1/4 noggs.	» 67	»	acetic acid 9° Tw. (30%) thicken with
10 pints	» 803	»	thickening W
	1000 grms.		

Thickening W.

Boil:			
4 3/4 pints	or 387 grms.		water
2 lbs.	» 129	»	acetate of soda
1 »	» 65	»	oxide of zinc and
3 1/4 »	» 258	»	British gum; when cold add
2 pints	» 161	»	albumen solution 1 : 1
	1000 grms.		

Acetate of magnesia and acetate of zinc are now employed along with oxide of zinc instead of acetate of soda.

70. **Basic colours,** which when dyed on a tannin mordant are **dischargeable** with **sulphite of potassium:**

Reds: Diamond Fuchsine
Pyronine G
Rhodamine B, G. S
Yellows: Auramine O, I, II, concentrated
Greens: China Green cryst.
Cotton Green
Methyl Green cryst. I extra yellow, I yellow
Blues: Brilliant Blue extra greenish
Cotton Blue I, IV, R R
Methylene Blue B B
Turquoise Blue B B, G

Recipe for White Discharging.

The material mordanted in the ordinary manner with tannic acid and tartar emetic and then dyed with Basic colour is discharged with the following:

4 pints	or 524 grms.	potassium sulphite 90° Tw.
3 1/4 lbs.	» 209 »	British gum
1 pint 3/4 nogg.	» 95 »	water
1 lb. 15 oz.	» 124 »	acetate of soda
2 3/4 noggs.	» 48 ccm.	soda lye 76° Tw.
	1000 grms.	

Steam for 3 mins. without pressure, wash, soap, wash and dry.

71. **Basic colours,** which are not dischargeable, and therefore suit for **colour discharging** with **sulphite of potassium:**

Reds: Brilliant Rhoduline Red B D in paste
Rhoduline Red B, G in powder, G D in paste
Saffranine A, B extra, B B extra, F F extra
Blues: New Victoria Blue B
Rhoduline Blue R
Victoria Blue B
Violets: Methyl Violet 1 B — 5 R
Rhoduline Violet
Rhoduline Heliotrope B, 3 B

Colour Discharge Recipe.

Boil:

5	oz.	or 25	grms.	**Basic colour**
3	pints	» 265	»	British gum
5	»	» 410	»	water and
1 ¼	lbs.	» 100	»	acetate of soda, add cold
2	pints	» 200	»	potassium sulphite 90° Tw.
		1000 grms.		

Steam for 3 minutes without pressure, wash and dry. (Lakes such as 300 grms. chromate of lead paste can be taken in the colour discharge recipe in place of undischargeable Basic colours).

72. **Basic colours,** which can be employed e. g. on dischargeable Benzidine dyestuffs for **colour discharging** with **stannous oxide salts:**

Reds: Brilliant Rhoduline Red BD in paste
Pyronine G
Rhodamine B, G, S
Rhodamine 4G, 5G
Rhoduline Red B, G in powder, GD in paste
Saffranine A, B extra, BB extra, FF extra

Oranges: Coriphosphine O, OX, OX extra
Phosphine

Yellows: Auracine G
Auramine O, I, II, concentrated

Greens: Brilliant Green cryst.
China Green cryst.
Cotton Green
Emerald Green cryst.

Blues: Blue 8336 (Navy Blue)
Methylene Blue BB
New Victoria Blue B
Rhoduline Sky Blue BB
Victoria Blue B

Violets: Brilliant Rhoduline Purple R
Methyl Violet 1B—5R
Rhoduline Heliotrope B
Rhoduline Violet

For the directions for colour discharging with Basic colours and stannous oxide salts on a Benzidine colour ground see under No. 25, page 46.

73. **Basic colours** which when dyed on **cotton** mordanted with tannic acid are dischargeable with Hydrosulphite NF.

Reds: Diamond Fuchsine
New Magenta
Oranges: Chrysoidine G, R
Greens: *Brilliant Green cryst.
*China Green cryst.
*Cotton Green
Methyl Green I yellowish, I extra yellowish, I extra bluish, I bluish
*Emerald Green cryst.
Blues: Cotton Blue I—VI, R, RR, BSP
Brilliant Blue extra greenish
Night Blue extra greenish
*New Victoria Blue B
*Turquoise Blue BB, G
*Victoria Blue B
Violets: *Methyl Violet 1B—7B, RB, 1R—5R
Browns: Bismarck Brown F, FF, M, LL extra, R, R extra

74. **Basic colours**, which when dyed are **dischargeable** with **zinc powder:**

Reds: Rhodamine 4G, 5G
Oranges: Chrysoidine cryst. (rather good)
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green cryst.
China Green cryst.
Cotton Green
Emerald Green cryst.
Methyl Green crystals I yellowish, I bluish
Blues: Cotton Blue I—VI, R
New Victoria Blue B
Night Blue extra greenish
Turquoise Blue BB, G
Victoria Blue B

* The discharges on some Triphenylmethan dyestuffs, namely those marked with an asterisk, sometimes become coloured again when exposed to the action of the atmosphere, so it is advisable to employ them for colour discharges.

Violets: Brilliant Rhoduline Purple R
Methyl Violet 5R—7B
Browns: Bismarck Brown F, FF, LL extra, M, R, R extra (rather good)

75. **Basic colours,** which can be employed e. g. on dischargeable Benzidine dyestuffs for **colour discharging** with **zinc powder**:

Reds: Brilliant Rhoduline Red BD in paste
Rhoduline Red B in powder, GD in paste
Saffranine A, B extra, BB extra, FF extra
Oranges: Coriphosphine O, OX, OX extra
Blues: Methylene Blue BB
Rhoduline Blue R, GG extra
Rhoduline Sky Blue BB
Violets: Rhoduline Heliotrope B, 3B

Recipe for Colour Discharges with Basic dyestuffs and zinc powder on Benzidine colours.

Dissolve:

2 1/2 oz.	or	10 grms.	**Basic colour** in
3/4 pint	»	60 »	water and warm up with
3 pints	»	300 »	gum solution 1 : 1, add
4 3/4 lbs.	»	300 »	zinc powder, and when cold add
3 pints	»	300 »	sodium bisulphite 71° Tw.
1/8 »	»	30 »	acetic acid tannic acid solution 1 : 1
		1000 grms.	

Steam for 1/2 hour without pressure, pass through tartar emetic (1 lb. per 10 galls. water) wash and dry.

76. **Basic colours,** which are adapted for the **dyeing** of cotton cloth previously treated with tannic acid and **discharged with caustic soda:**

Reds: Brilliant Rhoduline Red B in powder, BD in paste
Diamond Fuchsine
New Magenta
Pyronine G
Rhodamine B, G, S
Rhodamine 4G, 5G
Rhoduline Red B, G in powder, GD in paste
Saffranine A, B extra, BB extra, FF extra

Oranges: Coriphosphine O, OX, OX extra
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green cryst.
Cotton Green
Methyl Green
Blues: Methylene Blue BB
New Victoria Blue B
Rhoduline Blue R, GG extra
Rhoduline Sky Blue BB
Turquoise Blue BB, G
Violets: Brilliant Rhoduline Purple R
Methyl Violet 2B
Rhoduline Violet
Rhoduline Heliotrope B, 3B

Recipe for Discharging.

White Discharge.

11	oz.	or 44	grms.	maize starch
2 1/2	noggs.	» 47	»	water
2	pints	» 205	»	gum water 1 : 1
5 3/4	»	» 704	»	soda lye 106° Tw.
		1000 grms.		

Pad the cotton cloth with 1 1/2—2 lbs. tannic acid per 10 gallons water, dry, then slop-pad with 1—2 lbs. tartar emetic per 10 gallons water, dry, cover-print with the above paste thickened with soda lye, steam for 1/2—1 1/2 mins. in the Mather & Platt, wash, pass through a weak solution of hydrochloric acid 5 : 1000 (many printers run the pieces immediately after they are steamed through sulphuric acid 2° Tw.) and wash again; then dye cold for 1/2 hour in a neutral bath (i. e. without any acid) with the requisite quantity of Basic colour, 10% glue solution 1 : 10, 1% sulphate of alumina, 4% tartar emetic, raise the temperature afterwards within 1/2 hour to the boil, and continue dyeing for another 1/2 hour at this temperature, wash well, soap for 5—10 mins. at 140° Fahr., wash, dry, and if necessary chlore slightly.

Remarks: In order to counteract stripes that may result from the doctors it is of advantages to pad the pieces mordanted with tannic acid with 1—2 lbs. sal ammoniac salt per 10 gallons water before printing

them, or add the above quantity of sal ammoniac salt to the tartar emetic bath, in which latter case the pieces should not be washed but dried at once.

77. **Basic colours,** which when **dyed** are **dischargeable** with **caustic soda** (and grape sugar):

Reds: Rhodamine B, G, S
Rhoduline Red B, G (rather good)
Yellows: Auramine O, I, II, concentrated
Blues: Turquoise Blue BB and G
Violets: Methyl Violet 1B, 1R
Rhoduline Violet (rather good)

Recipes for Discharging.

White Discharge I.

Dissolve:				
2 lbs.	or	163 grms.	caustic soda in	
2 3/4 pints	»	270	»	water, mix this with
2 lbs.	»	162	»	glucose and
5—1 3/4 lbs.	»	405—135	»	dextrine dissolved in
0—2 3/4 pints	»	0—270	»	water
		1000 grms.		

White Discharge II.

13 pints	or	727 grms.	soda lye 76° Tw.	
4 1/4 lbs.	»	136	»	dextrine
2 3/4 »	»	91	»	glucose and
3 1/2 noggs.	»	46	»	silicate of soda 32° Tw.
		1000 grms.		

warm up to 160° Fahr., allow to remain at this temperature for 20 mins. and then stir until cold.

Steam for 1 1/2 mins. without pressure, acidulate slightly with 2 lbs. hydrochloric acid per 10 gallons water, wash and dry.

78. **Basic colours,** which are adapted for **mercerised articles:**

Reds: Brilliant Rhoduline Red B
Rhodamine 5B
Yellows: Auracine G
Blues: Victoria Blue B
Rhoduline Blue R
Violets: Rhoduline Heliotrope B, 3B

The directions for producing crepon effects on material dyed with Basic colours see under No. 41 c, page 78.

79. **Basic colours,** which when **dyed** or **printed** are remarkably **fast to washing:**

Reds: Pyronine G
Rhodamine 5 G
Oranges: Coriphosphine O, OX, OX extra
Yellows: Auramine O, I, II, conc.
Greens: Brilliant Green crystals
Methyl Green cryst. I bluish, I yellowish
Blues: Methylene Blue BB
New Fast Blue F
Rhoduline Blue R, GG extra
Turquoise Blue BB, G
Violets: Methyl Violet 1B—6B, 1R, 2R
Rhoduline Heliotrope B, 3B
Greys: New Fast Grey

80. **Recipe for Resists for Basic Colours.**

White Resist I.

Boil:

3 pints or 810 grms. tartar emetic soda salt solution 125° Tw. and
19 oz. » 190 » British gum
1000 grms.

White Resist II.

22 oz. or 222 grms. Antimonine
$1\frac{7}{8}$ pints » 370 » water
$2\frac{1}{4}$ lbs. » 370 » light burnt starch
$3\frac{3}{4}$ oz. » 38 » acetate of soda
1000 grms.

After the White resist has been printed on and the pieces dried, they are then cover-printed with print paste containing Basic colour, steamed for 1 hour without pressure, run through tartar emetic washed, soaped slightly, washed again and dried.

Colour Resists are obtained by adding Benzidine colours to the White resists: such as, Geranine G, Chloramine Yellow M, Congo Orange G, etc.

Colour Resists.

Boil:					
1 3/4	oz.	or	18	grms.	**Benzidine colour** in
3/4	pint	»	150	»	water
2	pints	»	532	»	tartar emetic soda salt 123° Tw. and
30	oz.	»	300	»	British gum.
			1000	grms.	

Work in the same manner as with White Resists.

81. **Katigen colours** (sulphide colours) which are adapted for the **dyeing** of **cotton:**

Greens: Katigen Chrome Blue 5 G
Katigen Green 2 B, 2 B 22456
Katigen Olive G, GN

Blues: Katigen Chrome Blue 2 R
Katigen Indigo B, B extra, R extra, RL extra

Browns: Katigen Brown V extra, 2 R
Katigen Chrome Brown 5 G (chrome)
Katigen Yellow Brown G G, GG extra, R
Katigen Black Brown N, N extra conc.

Blacks: Katigen Blue Black B, 4 B, R
Katigen Black SW, SW extra, TG, TG extra, TR extra, 2 B, SWR, SWR extra

Yellows: Katigen Yellow G

Directions for Dyeing Katigen Colours.

Dissolve the Katigen colour, according to the solubility of the respective dyestuff, with the corresponding amount of sulphide of soda in 10—20 times the amount of boiling water, and then add this colour solution to the dye bath, which has been previously boiled up with soda, and if necessary, the lime scum should be removed from the surface of the liquor, boil up for about 5 mins., afterwards add the Glauber's or common salt, boil up again for 5—10 mins., turn off steam, and then enter the goods.

According to the depth of shade the Katigen Colours are dyed for 1 hour at the boil in a volume of dye liquor of 15—20 : 1 of goods with the following additions.

Dye best for about 1 hour with indirect steam, dark shades at 185—195° Faht., light and medium shades at 85—120° Faht., first turn the yarns 4—6 times, and afterwards turn them every 5—10 mins. In order to

Percentages for first baths.

Names of the Katigen Colours.	dyed with			after-treated with			
	Sodium sulphide	Glauber's salt cryst. or half this quantity of common salt	Soda ash	Bichrome	Copper Sulphate	Acetic acid	Alum
20% Katigen Chrome Blue 5G	10%	60%	8%	2%	2%	3%	—
20% Katigen Green 2B, 2B 22456	3—5%	60%	8%	—	—	—	—
20% Katigen Olive G	10%	60%	8%	3%	1 1/2%	3%	—
20% Katigen Olive GN	10%	60%	8%	—	—	—	—
20% Katigen Chrome Blue 2R	15%	10%	8%	2%	5%	3—5%	—
7 1/2% Katigen Indigo B extra	15%	0—5%	8%	3%	3%	3—5%	—
7 1/2% Katigen Indigo R extra	15%	5—10%	8%	3%	3%	3—5%	—
7 1/2% Katigen Indigo RL extra	15%	10—20%	8%	3%	3%	3—5%	—
15% Katigen Brown V extra	2%	30%	8%	—	—	—	—
20% Katigen Chrome Brown 5G	10%	60%	8%	3%	3%	5%	—
20% Katig. Yellow Brown GG 10% GG extra	10%	60%	8%	—	—	—	—
20% Katigen Black Brown N	5%	60%	8%	—	—	—	—
20% Katigen Blue Black B	20%	25%	8%	2%	3%	3—5%	—
20% Katigen Blue Black 4B	10%	60%	8%	2 1/4%	—	2—5%	3%
20% Katigen Blue Black R	20%	25%	8%	2%	3%	3—5%	—
20% Katigen Black 2B	15%	60%	8%	2 1/4%	—	2—5%	3%
20% Katigen Black SW, 10% SW extra	20%	60%	8%	2 1/4%	—	2—5%	3%
20% Katigen Black TG	20%	60%	8%	2 1/4%	—	2—5%	3%
20% Katigen Yellow G	20%	30%	6%	3%	3%	5%	—
20% Katigen Yellow Brown R	20%	30%	6%	3%	3%	5%	—
20% Katigen Brown 2R	20%	25%	6%	3%	3%	5%	—
20% Katigen Black SWR	20%	30%	8%	2 1/4%	—	—	3%

produce more level shades when employing Katigen Indigo R extra and R L extra it is advisable to dye at a temperature of 110—120° Faht. When dyeing pieces in the jig with our Blacks an addition of 2—3 % dextrine yields good results. Never employ more than 3 % dextrine, as a greater quantity causes too hard a handle, and this is increased according to the number of times the respective dye liquor is employed. For standing baths replenish with ½—1 % dextrine according to the quantity of dye liquor lost. The dye baths in time become slimy owing to the dextrine accumulating too much.

Any kind of vat made of wood or iron (copper is affected too much) with an iron coil can be employed.

After dyeing, squeeze well either with a couple of sticks or through squeezing rollers, and rinse at once in a rinsing bath containing 1—3 % sulphide of soda for Katigen Blacks and Katigen Indigo R extra. Finally rinse in 2 or 3 different rinsing baths without the addition of sulphide of soda until the liquor is not tinted any more. Katigen Indigo R extra and R L extra are not rinsed at once after they have been squeezed out, but are hung up for some time, about ¾ to 1 hour in the open air, and then rinsed as above stated. If the shades are to be after-treated, then do so for 25—30 mins. at 100—190° Faht. and afterwards rinse well.

When topping with Basic colours this should be done best in a luke warm soap bath, and in order to produce more level shade the colour solution should be added in small portions.

Remarks: Although some of the Katigen Colours can be dyed without the addition of sulphide of soda, it is more advantageous, as can be seen from the table on the preceding page, to dye with a slight addition.

The percentages given are for dark shades, and for light shades not only the percentages of colour but the other ingredients should be decreased.

When dyeing in standing baths the percentages of colour and engredients should be reduced as follows: e. g. for a Black for the first 4 baths:

	I.	II.	III.	IV.
Katigen Black	20—	16—	14—	12 %
sulphide of soda crystals	20—	15—	12—	8 %
soda ash	8—	4—	2—	1 %
Glauber's salt crystals	60—	25—	15—	10 %

(or half this amount common salt).

Instead of working as was hitherto the case by graduating the percentages for the first few baths, the percentages are now regulated for the first bath in such a manner that the second bath can be considered at once as a standing bath.

For further particulars concerning the preparing of baths we refer you to our work entitled **„The Katigen Colours“**, No. 902, published in 1902.

As the so-called dead cotton is not easily dyed by the Katigen colour, the cotton should be previously treated with 4% soda lye 62° Tw.

82. **Katigen Colours** (sulphide colours) which are remarkable for their **good solubility,** dissolving **direct** (without any addition of sulphide of soda):

Greens: Katigen Green 2 B, 2 B 22546
Katigen Chrome Blue 5 G
Browns: Katigen Brown V extra
Katigen Chrome Brown 5 G
Katigen Black Brown N, N extra concen.

83. **Katigen colours** (Sulphide colours) which are remarkable for their **good solubility** on **adding** the **same quantity** of sulphide of soda as colour (at least 4 oz. per pint):

Blues: Katigen Chrome Blue 2 R
Browns: Katigen Brown V extra
Katigen Chrome Brown 5 G
Katigen Yellow Brown G G, G G extra
Katigen Black Brown N
Blacks: Katigen Blue Black B, R
Katigen Black 2 B, S W, T G

84. **Katigen colours** (Sulphide colours) which when dyed **are fast to alkali,** resisting 20% ammonia:

Greens: Katigen Chrome Blue 5 G
Katigen Chrome Blue 5 G (coppered, chromed)
Katigen Green 2 B, 2 B 22456
Katigen Olive G, G N
Katigen Olive G, G N (coppered, chromed)
Blues: Katigen Indigo B, B extra (trifle redder), B W extra, R extra, R L extra
Katigen Indigo B, B extra (trifle redder), R extra, R L extra, B W extra (coppered, chromed)
Browns: Katigen Black Brown N, N extra conc.
Katigen Black Brown N, N extra conc. (coppered, chromed)

Browns: Katigen Brown V extra (coppered, chromed)
Katigen Chrome Brown 5G
Katigen Chrome Brown 5G (coppered, chromed)
Katigen Yellow Brown GG, GG extra, R
Katigen Yellow Brown GG (coppered chromed)

Blacks: Katigen Blue Black B, 4B, R, B extra
Katigen Blue Black B, 4B, R (coppered, chromed)
Katigen Black 2B, SW, SW exra, TG, TG extra, SWR, SWR extra
Katigen Black 2B, SW, SW extra, TG extra, SWR, SWR extra (coppered, chromed)

85. **Katigen colours** (sulphide colours) which are fast to acids, fast to perspiration, resisting **acetic acid** 9° Tw.:

Greens: Katigen Chrome Blue 5G
Katigen Chrome Blue 5G (coppered, chromed)
Katigen Green 2B, 2B 22456
Katigen Olive G, GN
Katigen Olive G (coppered, chromed)

Blues: Katigen Chrome Blue 2R
Katigen Indigo B, B extra (fairly good) BW extra, R extra, RL extra
Katigen Indigo B, BW extra, R extra, RL extra (coppered, chromed)

Browns: Katigen Black Brown N, N extra conc.
Katigen Black Brown N, N extra conc. (coppered, chromed)
Katigen Brown V extra, 2R (coppered, chromed)
Katigen Chrome Brown 5G
Katigen Chrome Brown 5G (coppered, chromed)
Katigen Red Brown R direct, and after-chromed and coppered
Katigen Yellow Brown GG, GG extra, R
Katigen Yellow Brown GG, GG extra (coppered chromed)

Blacks: Katigen Black 2B, SW, SW extra, SWR extra, TG, TG extra

Blacks: Katigen Black 2B, SW, SW extra, SWR extra (coppered chromed)
Katigen Blue Black B, 4B, R, B extra
Katigen Blue Black B, R (coppered, chromed)

86. **Katigen colours** (sulphide colours) which when dyed are fast to **ironing** (resisting heat):

Greens: Katigen Chrome Blue 5G
Katigen Green 2B, 2B 22456
Katigen Olive G (fairly good) GN
Katigen Olive G, GN (coppered, chromed)

Blues: Katigen Chrome Blue 2R
Katigen Chrome Blue 2R (coppered, chromed)
Katigen Indigo B, B extra, BW extra, R extra, RL extra
Katigen Indigo B, B extra, R extra, BW extra, RL extra (coppered, chromed)

Browns: Katigen Black Brown N, N extra conc.
Katigen Black Brown N, N extra conc. coppered, chromed)
Katigen Brown V extra, 2R
Katigen Brown V extra (coppered, chromed)
Katigen Chrome Brown 5G
Katigen Chrome Brown 5G (coppered, chromed)
Katigen Yellow Brown GG, GG extra, R
Katigen Yellow Brown GG, GG extra (coppered, chromed)

Blacks: Katigen Blue Black B, R, 4B, B extra
Katigen Blue Black B, 4B, R (coppered, chromed)
Katigen Black 2B, SW, SW extra, SWR extra, TG extra, T extra
Katigen Black 2B, SW, SW extra, SWR extra, TG extra, T extra (coppered, chromed)

Yellows: Katigen Yellow G

87. **Katigen colours** (sulphide colours) which are **fast to light:**

Greens: Katigen Chrome Blue 5G
Katigen Olive G, GN
Katigen Green 2B, 2B 22456

Blues: Katigen Chrome Blue 2R

Blues: Katigen Indigo B, B extra, B W extra, R extra R L extra

Browns: Katigen Black Brown N, N extra conc.
Katigen Brown V extra, 2 R
Katigen Chrome Brown 5 G (coppered, chromed)
Katigen Yellow Brown G G, G G extra

Browns: Katigen Yellow Brown G G, G G extra (coppered, chromed)

Blacks: Katigen Black S W, S W extra, T G, T G extra
Katigen Blue Black B, 4 B, R, B extra

88. **Katigen colours** (sulphide colours) which when dyed are **fast to washing**:

Greens: Katigen Chrome Blue 5 G
Katigen Green 2 B, 2 B 22456
Katigen Olive G, G N

Blues: Katigen Chrome Blue 2 R
Katigen Indigo B, B extra, B W extra, R extra, R L extra

Browns: Katigen Brown V extra, 2 R
Katigen Chrome Brown 5 G (coppered, chromed)
Katigen Yellow Brown G G, G G extra, R
Katigen Black Brown N, N extra conc.

Blacks: Katigen Black S W, S W extra, S W R extra, T G, T G extra, 2 B
Katigen Blue Black B, 4 B, R, B extra

89. **Katigen colours** (sulphide colours) which when dyed are **fast to the boil:**

Greens: Katigen Chrome Blue 5 G
Katigen Green 2 B, 2 B 22456
Katigen Olive G, G N

Blues: Katigen Indigo B, B extra, B W extra, R extra, R L extra

Browns: Katigen Black Brown N, N extra conc.
Katigen Brown V extra
Katigen Chrome Brown 5 G
Katigen Chrome Brown 5 G (coppered, chromed)
Katigen Yellow Brown G G, G G extra, R

Blacks: Katigen Blue Black B, 4 B (fairly good), R (fairly good), B extra
Katigen Black S W, S W extra, T G, T G extra

90. **Katigen colours** (sulphide colours) which when dyed are **fast to cross dyeing:**

Greens: Katigen Green 2 B, 2 B 22456
Katigen Olive G, G N

Blues: Katigen Chrome Blue 2 R
Katigen Indigo B, B extra, R extra, B W extra, R L extra

Browns: Katigen Black Brown N, N extra conc.
Katigen Brown V extra
Katigen Chrome Brown 5 G

Browns: Katigen Yellow Brown G G, G G extra, R

Blacks: Katigen Black S W, S W extra, T G, 2 B
Katigen Blue Black B, 4 B, R, B extra

91. **Katigen colours** (sulphide colours) which when dyed are remarkable for their comparatively good **fastness to stoving:**

Greens: Katigen Chrome Blue 5 G (bluer)
Katigen Chrome Blue 5 G (coppered, chromed) (bluer)*
Katigen Green 2 B (bluer)
Katigen Green 2 B (coppered, chromed) (duller)
Katigen Olive G (yellower)*
Katigen Olive G (coppered, chromed) (good)
Katigen Olive G N (good)
Katigen Olive G N (coppered, chromed) (good)

Blues: Katigen Chrome Blue 2 R (red)*
Katigen Chrome Blue 2R (coppered, chromed) (redder)*
Katigen Indigo B (clearer)
Katigen Indigo B (coppered, chromed) (redder)
Katigen Indigo B extra (clearer)
Katigen Indigo B extra (coppered, chromed) (good)
Katigen Indigo B W extra (bluer)
Katigen Indigo B W extra (coppered, chromed) (duller)*
Katigen Indigo R extra (clearer)

* The stoved shades of those colours marked with an asterisk, when affected by this treatment, become clean again when washed in water.

Blues: Katigen Indigo R extra (coppered, chromed) (fairly good)
Katigen Indigo RL extra (redder)
Katigen Indigo RL extra (coppered, chromed) (duller)*

Browns: Katigen Brown V extra (bluer)*, 2R
Katigen Brown V extra (coppered, chromed) blacker)*
Katigen Chrome Brown 5G (yellower)

Browns: Katigen Chrome Brown 5G (coppered chromed) (trifle redder)*
Katigen Yellow Brown GG (trifle redder), R
Katigen Yellow Brown GG (coppered, (chromed) (good)
Katigen Yellow Brown GG extra (redder)
Katigen Yellow Brown GG extra (coppered, chromed) (good)
Katigen Black Brown N (good)
Katigen Black Brown N (coppered, chromed) (good)

Blacks: Katigen Blue Black B (redder)*, B extra
Katigen Blue Black B (coppered, chromed) (redder)*, B extra
Katigen Blue Black 2B (redder)
Katigen Blue Black 2B (coppered, chromed) (redder)
Katigen Blue Black 4B (fairly good)
Katigen Blue Black 4B (coppered, chromed) (fairly good)
Katigen Blue Black R (redder)*
Katigen Blue Black R (coppered, chromed) (redder)*
Katigen Black SW, SW extra (redder)* SWR extra
Katigen Black SW, SW extra (coppered, chromed) (good)
Katigen Black TG (greyer)* T extra
Katigen Black TG (coppered, chromed), (greyer)*, TG extra, SWR, SWR extra

* The stoved shades of those colours marked with an asterisk, when affected by this treatment, become clean again when washed in water.

92. **Katigen colours** (sulphide colours) which are adapted for **direct cotton printing** with **nickel plated** rollers:

Greens: Katigen Chrome Blue 5 G
Katigen Green 2 B, 2 B 22456
Katigen Olive G, GN

Blues: Katigen Chrome Blue 2 R
Katigen Indigo B, B extra, B W extra, R extra, R L extra

Browns: Katigen Black Brown N, N extra conc.
Katigen Brown V extra, 2 R
Katigen Yellow Brown G G, G G extra, R

Blacks: Katigen Black 2 B, S W, S W extra, T G, T G extra, S W R extra
Katigen Blue Black B, 4 B, R, B extra

Yellows: Katigen Yellow G

Boil up: **Directions for Printing.**

5—12 oz.	or 50—120 grms.	**Katigen Colour**	
6— 9 »	» 60—90 »	sulphide of soda crystals	
3 »	» 30 »	soda ash and	
3 1/2—1 1/2 pints	» 340—160 »	water, and then sir in	
2 3/4—3 »	» 550—600 »	mucilage of tragacanth 65 : 1000 or British gum water 1 : 1	
1000 grms.			

Print only with **nickel** rollers, steam for 1 hour without pressure, rinse, malt, and if necessary after-treat in the usual manner with bichrome, copper sulphate and acetic acid for 10 mins. at the boil with:

per 10 gallons liquor	per litre liquor	
1 1/2 oz.	or 1	grm. bichrome
1 1/2—2 1/4 »	» 1—1 1/2	grms. copper sulphate and
1 1/2 pints	» 20	ccm. acetic acid 9° Tw.

rinse well and soap for 5—10 mins. at 140° Faht.

93. **Katigen colours** (sulphide colours) which when dyed are **dischargeable** with **oxidising agents:**

Greens: Katigen Chrome Blue 5 G
Katigen Green 2 B, 2 B 22456
Katigen Olive G, GN

Blues: Katigen Chrome Blue 2 R (rather good)
Katigen Indigo B, B extra, R extra, R L extra

Browns: Katigen Black Brown N, N extra conc.
Katigen Brown V extra, 2 R

Browns: Katigen Chrome Brown 5 G (chromed)
Katigen Yellow Brown G G, G G extra, R
Blacks: Katigen Black 2 B, S W, S W extra, T G, S W R extra
Katigen Blue Black B, 4 B, R, B extra

Material dyed according to the recipe given on page 130 can be discharged white with the following white discharging paste or the same correspondingly reduced.

Stir up: **White Discharge.**

20 lbs.	or	20	kilos	British gum and
5 pints	»	6	litre	water, to which add
56 lbs.	»	56	kilos	chlorate of alumina 42° Tw., then warm up and add
15 »	»	15	»	chlorate of soda; when cooled down add
2 »	»	2	»	red prussiate of potash and
1 »	»	1	»	perchloride of iron (solid)
		100	kilos.	

Steam for 1—3 mins. in Mather & Platt, soap for 5—10 mins. at 140° Faht., rinse and dry. Steam carefully, so that the material is not affected thereby. The white discharged styles, still containing the alumina can be dyed in the ordinary manner with Mordant colours, such as Alizarine Red, Alizarine Orange, etc.

Katigen colours can also be discharged with chlorate of iron or chlorate of chrome 23° Tw., and the chrome- or iron-oxide still retained in the material in the discharges can be dyed with Mordant colours, such as Gallo Cyanine, Alizarine Cyanine R, Alizarine Viridine F F, etc.

94. **Katigen colours** (sulphide colours) which when dyed are **not dischargeable** with **tin:**

Greens: Katigen Chrome Blue 5 G
Katigen Green 2 B, 2 B 22456
Katigen Olive G, G N
Blues: Katigen Indigo B, B extra, B W extra, R extra, R L extra
Browns: Katigen Black Brown N
Katigen Brown V extra, 2 R
Katigen Chrome Brown 5 G
Katigen Red Brown R
Katigen Khaki G extra
Katigen Yellow Brown G G, G G extra

Yellows: Katigen Yellow G
Blacks: Katigen Black 2B, SW, SW extra, TG
SWR extra, TG extra
Katigen Blue Black B, 4B, R, B extra,

95. **Katigen colours** (sulphide colours) which are adapted for **dyeing mercerised cotton** (yarn or piece):
Greens: Katigen Green 2B
Katigen Olive G
Browns: Katigen Black Brown N
Katigen Yellow Brown GG
Blacks: Katigen Black TG, TG extra, SW, SW extra (somewhat reddish)

96. **Katigen colours** (sulphide colours) adapted for **dyeing cops**:
Greens: Katigen Green 2B, 2B 22456
Katigen Olive G
Blues: Katigen Indigo RL extra
Browns: Katigen Black Brown N, N extra conc.
Katigen Brown V extra
Katigen Yellow Brown GG, GG extra, R
Yellows: Katigen Yellows G
Greys: Katigen Black SW, SW extra, TG, TG extra
Blacks: Katigen Black 2B, SW, SW extra, TG
Katigen Blue Black B, 4B, R, B extra

97. **Basic colours** adapted for **topping Katigen colours**:
Reds: Rhoduline Red B
Saffranine FF extra
Yellows: Auramine II
Greens: Brilliant Green crystals
Cotton Green
Blues: Methylene Blue BB
Turquoise Blue G
Violets: Methyl Violet 1B, 2R
Rhoduline Heliotrope B
Rhoduline Violet
Browns: Bismarck Brown F, M, R extra

98. **Benzidine colours,** which can be dyed in **combination** with **Katigen colours** or be used for bottoming same:
Reds: Benzo Rhoduline Red B
Geranine G

Oranges: Chloramine Orange G
Toluylene Orange G
Yellows: Chloramine Yellow M, HW

99. The following products are adapted for producing **Ice colours** on cotton:

Reds: Paranitraniline in powder, Paranitraniline S (Beta Naphtole) (Developer A) (Naphtole LC)
Blues: Dianisidine Base (Beta Naphtole)
Dianisidine salt (Beta Naphtole)
Browns: Alpha Naphthylamin Base (Beta Naphtole)
Benzidine Base (Beta Naphtole)
Mononitro Benzidine (Beta Naphtole)
Blacks: Benzidine Base (developer ES)

100. The following colours, in conjunction with tin crystals or tannic acid are adapted for **colour discharges** or **resists** on **Ice colours:**

Reds: Brilliant Rhoduline Red B in paste (Tannic acid)
Diamond Fuchsine (Tannic acid)
Rhodamine B, G, S, B extra, G extra, S extra (Tannic acid)
Rhoduline Red B in powder, GD in paste (Tannic acid)
Saffranine FF extra (Tannic acid)
Yellows: Auramine O, I, II, concentrated (Tannic acid)
Auracine G
Greens: Brilliant Green cryst. (Tannic acid)
China Green cryst. (Tannic acid)
Cotton Green (Tannic acid)
Emerald Green cryst. (Tannic acid)
Blues: Blue 8336 (Tannic acid)
Gallamine Blue in paste (Chrome)
Gallo Cyanine (Chrome)
Methylene Blue BB (Tannic acid)
New Fast Blue F (Tannic acid)
New Victoria Blue B (Tannic acid)
Turquoise Blue BB (Tannic acid)
Victoria Blue B (Tannic acid)
Violets: Methyl Violet 5R—7R (Tannic acid)
Rhoduline Violet (Tannic acid)
Browns: Bismarck Brown (Tannic acid)
Greys: New Fast Grey (Tannic acid)

Directions for producing Ice Colours on the fibre along with White and Colours Resists or Discharges:

Paranitraniline Red.

Slop-pad the bleached cotton cloth with the following

Beta Naphtole Solution.

Dissolve:

17 1/2 oz.	or	250 grms.	**Beta Naphtole** in	
3/4 pint	»	250 ccm.	soda lye 66° Tw. and	
10 1/2 »	»	3000 »	hot water, then add	
1 3/4 »	»	500 grms.	Turkey Red oil 55%, and	
7 oz.	»	100 »	aluminate of soda dissolved in	
3 1/2 pints	»	1000 »	water, to which add	
1 3/4 »	»	500 »	mucilage of tragacanth 65 : 1000 then make up with water to	
35 pints	or	10 litres	respectively	

* Remarks: A bluish red can be obtained by employing Naphtole AR. A still more bluish tone is produced by using F. Gantert's (Barmen-Wupperfeld) and O. Starke & Co.'s (Plagwitz-Lindenau, Leipzig), Turkey Red oil" for Paranitraniline, as well as by using the Para soap.

Printing with Paranitraniline.

Cotton cloth padded with Beta Naphtole and dried, is printed with the following:

Paranitraniline Print Paste:

Dissolve:

3 1/2 oz.	or	17.7 grms.	**Paranitraniline powder** in	
1/2 pint	»	51.6 ccm.	hydrochloric acid 36° Tw. and	
1/2 »	»	51.6 »	boiling water, then add	
1 3/10 »	»	128.9 »	ice cold water, and when the solution has entirely cooled down add	
13 oz.	»	64.5 grms.	ice, then add slowly under constant stirring	
2 »	»	10 »	nitrite dissolved in	
2 1/2 noggs.	»	64.5 »	water. Allow to stand for 15 mins., filter, and then stir in	
5 3/5 pint	»	566.2 »	starch tragacanth thickening (K); before beginning to print add	
9 oz.	»	45 »	acetate of soda	
		1000 grms.		

After the goods have been printed and dried soap for 1/4 hour at 105° Faht.

Dyeing with Paranitraniline.

In order to produce plain shades on piece goods, the pieces padded with Beta Naphtole solution and dried (see preceding page) are run through the

Paranitraniline Developing Bath.

Stir up carefully, so that there are no lumps in the paste:

12	oz.	or	119 grms.	**Paranitraniline powder***
7 1/2	»	»	74 »	nitrite and
3 3/4	pints	»	762 ccm.	water, to this add the following mixture slowly
1 9/10	»	»	381 grms.	hydrochloric acid 36° Tw. and
9 1/2	»	»	1905 »	ice. Stir up for 1/4 hour, filter and then dilute with ice cold water to
38 1/4	pints	or	7619 grms.	— Before beginning to work add a solution of
3	lbs.	»	476 »	acetate of soda dissolved in
9 1/2	pints	»	1905 ccm.	ice cold water
			10000 grms.	

Test with potassium iodide starch paper in order to ascertain whether the Paranitraniline is completely diazotised; the paper should be tinged very bluish. The diazo combination of Paranitraniline can be preserved as long as the acetate of soda has not been added, after which, however, it should be used at once. The red developes as soon as the diazo combination comes into contact with the Beta Naphtole. Wash the wet pieces after a few minutes and then soap.

Material treated with Beta Naphtole should only be dried at a low temperature (about 100—120° Faht.) and care be taken that the pieces are not folded. As it easily turns brown by the action of the air, the further treatments should be carried out as soon as possible. An addition of oxide of antimony to the Beta Naphtole solution (Naphtole LC) prevents pieces, impregnated with Beta Naphtole, turning brown.

N. B. *For darker reds the quantity of Paranitraniline can be increased up to 170 grms. or 17 oz. resp., with the corresponding increased amount of nitrite. — **A part of the acetate of soda is sometimes substituted by ordinary soda.

In such case slop-pad as follows:
Dissolve hot:

4 lbs. 10 oz.	or	739 grms.	**Naphtole LC** in
5 1/4 pints	»	1099 ccm.	soda lye 36° Tw., and then add
34 1/2 »	»	6906 grms.	water and
6 1/4 »	»	1256 »	Turkey red oil
		10000 grms.	

For thin material this solution can be diluted with 25% water.

Paranitraniline Cutch.

By after-treating goods printed or dyed with Paranitraniline Red, with a boiling solution of copper (1 grm. per litre or 1 3/5 oz. per 10 gallons) cutch shades fast to light and washing can be obtained.

The same shades can be obtained on goods treated with Beta Naphtole, by adding about

1/2 pint	or	60 grms.	chloride of copper 76° Tw. to
9 1/4 »	»	940 »	Paranitraniline Red print paste as on page 143
		1000 grms.	

White Resist.

As a white resist on cotton cloth prepared with Beta Naphtole sodium (See page 143) for Paranitraniline Red the following are serviceable:

White Resist Z.

4 1/3 pints	or	433 grms.	mucilage of tragacanth 52 : 1000
4 1/4 lbs.	»	337 »	tin crystals
13 1/2 oz.	»	67 »	tartaric acid
23 »	»	115 »	stannous hydrate 50%
1/2 pint	»	48 »	olive oil
		1000 grms.	

or

White Resist K.

30 oz.	or	300 grms.	British gum
3 1/4 pints	»	700 »	potassium sulphide 90° Tw.
		1000 grms.	

After printing on the resist on cloth impregnated with Beta Naphtole solution (See page 143) pass the cloth through the diazo solution (See page 144), then wash, soap as above stated, wash again and dry.

Colour resists or discharges.

Green Resists.

Dissolve:

1 oz.	or	10 grms.	**Brilliant Green crystals** and
3 »	»	30 »	**Auramine concentrated** in
1 pint	»	200 »	acetic acid 9° Tw. (30%), add
5 »	»	500 »	acetic acid starch tragacanth thickening (R)
5 oz.	»	50 »	tartaric acid
1 nogg.	»	50 »	glycerine 48° Tw.
1/5 »	»	40 »	acetic acid tannic acid solution 1 : 1
12 oz.	»	120 »	tin crystals
		1000 grms.	

Yellow Resist.

Dissolve:

5 1/2 oz.	or	27.5 grms.	**Auramine II** in
1 1/5 pints	»	110.1 »	acetic acid 9° Tw. (30%) then add
3 1/2 »	»	367 »	acetic acid starch tragacanth thickening (R)
1 2/5 »	»	137.6 »	acetine
2 lbs.	»	160.5 »	tannic acid
1 2/5 pints	»	137.6 »	acetic acid 9° Tw. (30%)
1 1/4 noggs.	»	36.7 »	tartaric acid solution 52° Tw.
1/5 nogg.	»	23 »	glycerine 48° Tw.
		1000 grms.	

Blue Resist A.

Boil:

3 1/5 pint or 769 grms. { Potassium sulphite discharge { 2 3/4 pints or 660 grms. potassium sulphite 90° Tw. / 1 1/4 lbs - 200 - British gum and / 4 oz. - 40 - wheat starch }

3 1/5 noggs - 166 - 5% solution of Alkali Blue 2 B, and when cold add

1 3/10 - - 65 - egg albumen solution 2 : 1

Instead of albumen solution acetate of alumina or acetate of chrome can be employed.

Blue Resist U.

30 oz.	or	300 grms.	**Ultramarine**
1 pint	»	200 »	glycerine 48° Tw.
1 1/2 noggs.	»	80 »	water
1/2 pint	»	100 »	mucilage of tragacanth 60 : 1000
3/4 »	»	150 »	albumen solution 1 : 1
3 noggs.	»	170 ccm.	potassium sulphite 90° Tw.
		1000 grms.	

Blue Discharge G.

10 3/4 noggs.	or 540 grms.		starch tragacanth thickening (K)
1 1/2 lbs.	» 240	»	tin crystals
1 2/5 noggs.	» 70	»	ammonium sulphocyanide
3 oz.	» 30	»	citric acid powder
1 3/5 noggs.	» 70	»	**Gallamine Blue 30%**
5 oz.	» 50	»	acetate of soda
	1000 grms.		

Steam for 5—10 mins. without pressure, wash and dry. In order to develope the shade on pieces discharged with Gallamine Blue it is necessary to run them through a weak bath of bichrome or subject them to running water.

In order to obtain the chrome lake of the Gallamine Blue, 60 grms. or 1 1/5 noggin respectively acetate of chrome 32° Tw. can also be added to the print paste, but such a Blue appears slightly duller in tone.

Prints with Paranitraniline S.

Print on cotton material padded with Beta Naphtole solution (See page 144):

Dissolve:

3 1/2 oz.	or 35.8 grms.		**Paranitraniline S** in
4/5 nogg.	» 23	ccm.	hydrochloric acid 36° Tw. and
1/2 pint	» 102	grms.	boiling water, then add
3 1/5 noggs.	» 159	»	cold water, and all in one lot under constant stirring
1 oz.	» 10	»	nitrite dissolved in
1 1/5 noggs.	» 63	»	water; allow to stand for 1/4 hour, filter, then add
2 4/5 pint	» 563	»	starch tragacanth thickening (K), and before starting to print add
4 1/2 oz.	» 45	»	acetate of soda
	1000 grms.		

Directions for working see page 143.

Dyeing with Paranitraniline S.

For the production of plain shades by means of Paranitraniline run the cloth previously padded with Beta Naphtole solution through the diazo solution prepared as follows:

Stir up:

3 1/2 oz.	or	34 grms.	**Paranitraniline S** in
2/5 nogg.	»	22 ccm.	hydrochloric acid 36° Tw. to which add
1 1/5 nogg.	»	61 »	hot water, warm up on the water bath untill all is perfectly dissolved, then pour in
3 pints	»	611 »	ice cold water, and all in one lot
1/2 »	»	100 »	nitrite solution 1 : 10, stir until the solution is quite clear, allow to stand for 1/4 hour, and just before use add
3 2/4 noggs.	»	184 »	solution consisting of 5 oz. or 50 grms. acetate of soda per 1/2 pint » 100 » water

1000 ccm.

Beta Naphtole Print paste.

Dissolve:

6 oz.	or	30 grms.	**Beta Naphtole** in
3 pints	»	310 »	hot water and
2 1/5 noggs.	»	60 ccm.	soda lye 36° Tw., thicken with
5 pints	»	500 grms.	mucilage of tragacanth 60 : 1000
1 pint	»	100 »	Turkey Red Oil (See remarks on page 144)

1000 grms.

Print the above Beta Naphtole print paste on cotton cloth, and then for plain shades run the pieces through the Paranitraniline developing bath (See pages 144 or above), wash, soap and dry.

Paranitraniline on Yarn.

The yarn previously bleached or boiled with soda, washed and dried, is steeped in the **Beta Naphtole solution** prepared in the manner stated on page 143, and then hydroextracted. After the yarn has been hydroextracted it must show an increase of weight of 100%. In order to secure more uniform shades the yarn is steeped a second time, hydroextracted again, and dried at not too high a temperature, say up to about 130° Faht. The yarn must rotate during the drying process or be turned from time to time. Never impregnate more yarn than can be worked up in one day, as otherwise by the influence of the air it dyes

brownish in parts; by employing Naphtole I.C (See page 145) this can be obviated. When dry, enter the yarn impregnated with Beta Naphtole into the **Paranitraniline Developing Bath** employed for plain shades on piece goods (See page 144 or above). It is best to work with 2 lb. bundles at a time. Care should be particularly taken, when putting the yarn into the Diazo solution, that the material is not touched with wet hands, as spots will ensue in those places thus touched; the yarn must also be immersed at once thoroughly in the liquor until it is quite wet through. It should also not be pressed together too much, as otherwise the liquor cannot soak into the material sufficiently.

After developing, rinse at once in water, and then soap for 10 mins. at 140° Fahr.

N. B. By after-treating the Paranitraniline Red for several mins. with diluted nitric acid 1⅔ noggin per 10 gallons (5 ccm. per litre boiling water), and washing well afterwards, the shade becomes considerably faster to light. 5 grms. of bichrome ⅘ oz. per gallon) can also be added to the diluted nitric acid, whereby the shade becomes even somewhat faster. The after-treatment can also be carried out cold for 1 hour with 100—200 ccm. nitric acid per litre 1—2 pints per 10 pints cold water, and afterwards wash well.

Dianisidine Blue.

Pad the cotton cloth with the following:

Beta Naphtole Solution.

Dissolve:

3 oz.	or	30 grms.	**Beta Naphtole** in
1¼ pint	»	50 ccm.	caustic soda 36° Tw. and
1 »	»	200 »	water, to which add
2⅔ noggs.	»	120 grms.	castor oil ammonia or Turkey Red oil: stir the whole of this into
2 »	»	100 grms.	mucilage of tragacanth 65 : 1000, and then add
3 oz.	»	30 »	acetate of soda, and make up the whole of this with water to
5 pints	or	1 litre.	

Printing with Dianisidine.

The dried material previously padded with Beta Naphtole solution is printed with the following

Dianisidine Print paste (Dark Blue).

Dissolve:

1 1/2 oz.	or	a	14.3 grms.	**Dianisidine Base** in
1 1/8 pint	»		224 »	water and
2/5 nogg.	»		22.4 ccm.	hydrochloric acid 34° Tw., to which add slowly
1/2 pint		b	56 »	nitrite solution 145 : 1000
1 1/2 noggs.	»	c	40.3 »	chloride of copper solution 76° Tw.
1 1/2 pints	»		321.5 grms.	mucilage of tragacanth 65 : 1000
1 1/2 »	»		321.5 »	British gum water 750 : 1000
			1000 grms.	

Add solution »b« slowly to »a«, and afterwards add »c«. This print paste should be allowed to stand in ice for 2 hours before using same. When printed and dried, soap for 20 mins. at 140° Faht., wash and dry.

Instead of Dianisidine base the corresponding quantity of Dianisidine salt (hydrated chloride) can be employed. In place of 8 grms. Dianisidine Base and 12 ccm. hydrochloric acid 36° Tw. (8 oz. and 2 1/2 noggins resp.) take 10 1/2 grms. Dianisidine salt and 6 1/2 ccm. hydrochloric acid 36° Tw. (10 1/2 oz. and 1 1/2 noggins resp.).

Dianisidine Print paste (Medium Blue).

Dissolve:

1 oz.	or	9.9 grms.	**Dianisidine Salt** in
1/8 nogg.	»	5.9 ccm.	hydrochloric acid 36° Tw. and
2 3/10 »	»	115 »	hot water, to which add
2 3/4 »	»	137.6 »	ice water, add slowly
3/5 »	»	29.7 »	nitrite solution 145 : 1000
2/5 »	»	21.3 »	chloride of copper solution 76° Tw.
6 3/4 »	»	340.3 grms.	mucilage of tragacanth 65 : 1000
6 3/4 »	»	340.3 »	British gum water 750 : 1000
		1000 grms.	

For the above medium blue shade the Beta Naphtole solution on the preceding page can be diluted with 1/3rd water.

Dyeing with Dianisidine.

For the production of plain shades on piece goods with Dianisidine, run the dry pieces previously padded with Beta Naphtole solution (See preceding page) through the **Dianisidine Developing bath for plain shades on piece goods.**

Dissolve:

½ oz.	or 8	grms.	**Dianisidine base** in
¼ nogg.	» 12½	»	hydrochloric acid 36° Tw. and
5 noggs.	» 150	ccm.	boiling water, then add
30 oz.	» 300	grms.	ice, and when this has dissolved add slowly
⅘ nogg.	» 40	»	nitrite solution 145 : 1000 with
1 »	» 50	ccm.	ice water. Test with potassium iodide starch paper, which will turn blue if there is sufficient nitrite present. When this has cooled down add
½ »	» 23	ccm.	chloride of copper solution 76° Tw. and
2 »	» 100	»	ice water; filter and make up with ice water to

5 pints or 1 litre.

After running the pieces through this liquor for a short time, wash, and afterwards soap for 20 mins. at 140° Faht.

White Resist.

The following can be employed as white resists on material padded with sodium salt of Beta Naphtole and printed with Dianisidine Blue:

White Resist R.

Mix cold

6 pints	or 600 grms.		British gum water 750 : 1000
2 lbs. 14 oz.	» 230	»	tin crystals and
1 7/10 pints	» 170	»	sulphocyanide of ammonia
	1000 grms.		

or

White Resist B.

3½ lbs.	or 280 grms.		dark burnt starch
5½ pints	» 600	»	bisulphite of soda 68° Tw.
1 »	» 120	»	soda lye 72° Tw.
	1000 grms.		

or

White Resist M.

3¾	pints	or 388 grms.		farina tragacanth thickening
11	oz.	» 56	»	tin crystals
7	lbs.	» 556	»	chloride of magnesia crystals
		1000 grms.		

Alpha Naphtylamine Bordeaux.

(Ice Bordeaux.)

Pad the cotton cloth with the following

Dissolve: **Beta Naphtol solution.**

6	oz.	or 30 grms.		**Beta Naphtole** in
1½	noggs.	» 40 ccm.		soda lye 36° Tw. and
1	pint	» 100	»	water, then add
½	»	» 50 grms.		mucilage of tragacanth 65 : 1000
¾	»	» 75	»	Turkey Red oil 50 %. Make up the whole of this with water to
10	pints	or 1 litre.		

Prints with Alpha Naphtylamine.

The dry cotton cloth previously padded with the above Beta Naphtole solution is printed with the following

Alpha Naphtylamine print paste.

5	pints	or 500 grms.		**Alpha Naphtylamine solution N** (See next page)
3⅘	»	» 380	»	starch tragacanth thickening (K)
8	oz.	» 40	»	acetate of soda
⅘	pint	» 80	»	water
		1000 grms.		

When printed, dry and then soap for 20 mins. at 140° Faht.

Alpha Naphtylamine solution N.

Dissolve:

4½	oz.	or 22.8 grms.		**Alpha Naphtylamine Base** (solid) in
¾	nogg.	» 20	»	hydrochloric acid 36° Tw. and
1⅘	noggs.	» 37	»	water, to which add
1⅕	»	» 30	»	hydrochloric acid 36° Tw. and
3	pints	» 300	»	ice water, and add slowly at 32° Faht. in small portions
½	»	» 50	»	nitrite solution 290 : 1000, after 10 mins. filter and make up with cold water to
5	pints	or 500 ccm.		

Dyeing with Alpha Naphtylamine.

To produce plain shades on piece goods with Alpha Naphtylamine run the dry pieces previously padded with Beta Naphtole solution (See preceding page) through the

Alpha Naphtylamine Developing Bath for Plain shades on piece goods.

Dissolve:

30 oz.	or	151 grms.	**Alpha Naphtylamine Base** in
1 3/10 pints	»	137 »	hydrochloric acid 36° Tw. and
2 1/2 »	»	253 »	water, add
2 »	»	206 »	hydrochloric acid 36° Tw. and
20 »	»	2058 »	ice water, to which add slowly
3 9/10 »	»	343 ccm.	nitrite solution 290 : 1000, and then after 10 mins. make up with ice cold water to
34 »	»	3425 »	then add
26 »	»	2605 »	ice cold water, filter and then add
3 lbs. 6 oz.	»	274 grms.	acetate of soda dissolved in
5 1/2 pints	»	548 »	water
		10000 grms.	

Wash and then soap the cloth for 1/4 hour at 140° Faht.

White Resist.

For a white resist on Beta Naphtole under Alpha Naphtylamine the following can be employed:

White Resist W.

Dissolve:

2 lbs. 13 oz.	or	225 grms.	tartaric acid powder in
2 1/4 pints	»	225 »	hot gum water 250 : 1000, then add
3 lbs. 7 oz.	»	275 »	best quality dextrine, and when cold add
3 » 7 »	»	275 »	tin crystals
		1000 grms.	

As a white resist for Beta Naphtole the following is serviceable:

White Resist P.

Melt:

7 oz.	or	69	grms.	glue in
1 3/4 pints	»	345	»	water and
1 2/5 noggs.	»	69	»	paraffin, then add
1 1/4 lbs.	»	207	»	burnt starch, boil up and then add
1 lb. 11 oz.	»	276	»	tartaric acid, allow to cool down to 100° Fahr. to which add
2/3 nogg.	»	34	»	turpentine oil
		1000	grms.	

Print the White Resist P first on the cotton cloth, then treat with Beta Naphtole solution (See page 149), run through the Alpha Naphtylamine developing bath for plain shades on piece goods (See preceding page), pass through hot water, soap, wash and dry.

Yellow Resist B.

Melt:

5 oz.	or	50	grms.	glue in
1 7/8 pints	»	377	»	water and
1 nogg.	»	50	»	paraffin, to which add
15 oz.	»	151	»	nitrate of lead and
22 1/2 »	»	226	»	burnt starch, warm up and then add
1/3 nogg.	»	16	ccm.	sulphate of lead in paste
10 oz.	»	100	grms.	citric acid
3/5 nogg.	»	30	ccm.	turpentine oil
		1000	grms.	

After passing through the Alpha Naphtylamine Developing bath for plain shades on piece goods, (See preceding page), wash and chrome.

Benzidine Brown.

Prints with Benzidine.

The dry pieces previously padded with Beta Naphtole solution. (See page 149), are printed with the following

Benzidine Print paste.

Stir:

4 oz.	or	40 grms.	acetate of soda into
2 1/2 pints	»	500 »	mucilage of tragacanth 65 : 1000, and when dissolved add
2 »	»	400 »	**Benzidine solution B** and
1 1/5 nogg.	»	60 »	water
		1000 grms.	

When printed and dried, soap for 1/4 hour at 100° Faht.

Benzidine Solution B.

Dissolve at the boil:

5 1/2 oz.	or	36 grms.	**Benzidine Base** in
1 pint	»	200 ccm.	water and
4/5 nogg.	»	40 »	hydrochloric acid 36° Tw., allow to cool down, and then add
1 2/10 »	»	68 »	hydrochloric acid 36° Tw. and
30 oz.	»	300 grms	ice, and pour in at 32—40° Faht.
1/2 pint	»	104 ccm.	nitrite solution 290 : 1000.
			After 1/4 hour make up with
1 1/4 »	»	252 »	water to

5 pints or 1000 grms.

Dyeing with Benzidine.

For the production of plain shades on piece goods with Benzidine run the dry cotton cloth previously padded with sodium salt of Beta Naphtole (see page 149) through

The Benzidine Developing bath for plain shades on pieces.

Dissolve:

18 oz.	or	180 grms.	**Benzidine Base** in
1 pint	»	200 ccm.	hydrochloric acid 36° Tw. and
5 »	»	1000 »	boiling water, cool down slowly, then add
12 1/2 lbs.	»	2000 grms.	ice and
1 7/10 pints	»	340 ccm.	hydrochloric acid 36° Tw. pour in at 32—40° Faht.
2 3/5 »	»	520 »	nitrite solution 290 : 1000, after 1/4 hour, filter and before use add
2 1/2 lbs.	»	400 grms.	acetate of soda, thicken the diazo solution with
5 pints	»	1000 »	mucilage of tragacanth 6 : 100, and make up with water to

50 pints or 10 litres.

After running through this solution wash well and soap for 10 mins. at 100° Fahr.

N. B.

3 1/2 oz. or } 34 grms. Benzidine Base and
3/16 nogg. » } 46 » hydrochloric acid 36° Tw.
correspond with
1 nogg. or 48 grms. hydrated Benzidine (hydrated chloride).

Mononitrobenzidine Brown.

Pad the cotton cloth with the following

Beta Naphtole Solution.

Dissolve:

2 oz. or 20 grms. **Beta Naphtole** in
3/4 nogg. » 20 » soda lye 66° Tw. and
5 » » 266 » hot water, and then add
1 » » 50 » Turkey Red oil 50%, and
make up with water to

5 pints or 1 litre

Printing with Mononitrobenzidine.

After drying the cloth padded with Beta Naphtole solution (see preceding page) print with

Mononitrobenzidine print paste.

Stir up a mixture of

2 1/4 oz. or 23 grms. **Mononitrobenzidine** and
1 1/2 » » 14 » nitrite in
1 1/2 noggs. » 76 » water, cool down, and stir in slowly the thickening paste cooled down to 32° Tw. consisting of
2 1/2 pints » 510 » starch tragacanth thickening (K)
1 1/5 noggs. » 61 ccm. hydrochloric acid 36° Tw. and
5 » » 245 » water; before printing add
7 oz. » 71 grms. acetate of soda

1000 grms.

After drying, soap for 10 mins. at 85° Fahr. By after-treating with copper sulphate solution for 1/4 hour at the boil (1 grm. per litre, 1 1/4 oz. per 10 gallon) a browner and faster shade is obtained.

Dyeing with Mononitrobenzidine.

For the production of plain shades on piece goods with Mononitrobenzidine pass the dry cotton cloth previously prepared with Beta Naphtole solution (see preceding page) through

Mononitrobenzidine solution for plain shades on piece goods.

Mix up

2 9/10 oz.	or	29 grms.	**Mononitrobenzidine**
1 4/5 »	»	18 »	nitrite and
1 3/10 noggs.	»	65 »	water, cool down to 32° Faht., and pour this solution slowly into the following, also cooled down to 32° Faht.,
1 1/5 »	»	61 ccm.	hydrochloric acid 36° Faht. and
3 3/4 pints	»	755 »	water. After diazotising, and filtering, add
7 1/4 oz.	»	72 grms.	acetate of soda
		1000 grms.	

Wash the material without drying first, soap for 15 mins. at 85° Faht. wash and dry.

Developer ES Black.

(Ice Black.)

Pad the cotton cloth with

Developer ES solution.

Dissolve:

1 1/2 oz.	or	15 grms.	**Developer ES** in
1 1/2 pint	»	300 »	hot water, to which add
1 nogg.	»	50 »	Turkey red oil, and make up with water to
5 pints	or	1 litre.	

Ice Black Print.

After drying the cotton cloth padded with Developer ES solution print with

Diazotised Benzidine:

3 3/4 pints	or	370 grms.	**Benzidine solution S** (see below)
5 1/2 »	»	548 »	mucilage of tragacanth 65 : 1000
1 lb.	»	82 »	acetate of soda
		1000 grms.	

Dry, soap for 10 mins. at 120° Faht., wash and dry.

Benzidine solution S.

Dissolve at the boil:

9 1/2 oz.	or	48 grms.	**Benzidine Base** in
1 1/4 pints	»	131 »	hydrochloric acid 36° Tw. and
1 3/4 »	»	184 »	water, to which add
3 3/4 lbs.	»	310 »	ice, and further
3 1/4 pints	»	327 »	nitrite solution 145 : 1000
		1000 grms.	

Ice Black Dyeing.

For the production of plain black shades on pieces pad the cotton cloth first with

Developer ES solution.

Dissolve:

5	oz.	or	25 grms.	**Developer ES** in
3	pints	»	300 »	hot water, and then add
1/5	nogg.	»	5 »	glycerine 45° Tw. and
2 2/5	»	»	60 »	Turkey red oil, and make up with water to

10 pints or 1 litre.

Run the dry cloth through the

Ice Black Developing Bath for plain shades on piece goods.

Dissolve at the boil:

9 1/2	oz.	or	95 grms.	**Benzidine Base** in
5	noggs.	»	260 »	hydrochloric acid 36° Tw. and
7 1/4	»	»	370 »	water, then add
3 lbs.	14 oz.	»	620 »	ice
3 1/4	pints	»	655 »	nitrite solution 145 : 1000
14 3/4	»	»	2950 »	water
2 lbs.	14 oz.	»	460 »	acetate of soda and make up the whole with water to

6 1/4 gallons or 10 litres.

Run for a short time in the air in order to develope the colour, wash and dry.

Potassium sulphide, eventually with the addition of Auramine or Brilliant Green, etc. are employed for white and colour resists.

Ice Black.

On a Beta Naphtole bottom (see page 148) an Ice Black can be obtained by printing on a mixture of

850 parts Dianisidine Blue Print Paste (see page 149) and
150 » Benzidine Print Paste (see page 154)

1000 parts.

101. **Acid colours** which can be employed for the **dyeing** of **cotton** prepared with **alumina mordant**:

Reds: Brilliant Croceine 3 B
Croceine Scarlet 1 B, 2 B, 3 B, 5 B, 7 B, 9 B
Rhodamine B, G, S

Oranges: Croceine Orange G

Oranges: Mandarine G
Orange GT, IIB
Yellows: Fast Light Yellow G
Quinoline Yellow
Blues: Alizarine Blue SAP, SAC, SAE

Directions for Dyeing Acid Colours on an Alumina Mordant:

1. Enter the previously soaped cotton material in the dye bath containing the Acid colour and 3—4 % alum (Volume of dye liquor 10 : 1 of goods), and dye luke warm.

The colour in the dye bath is not exhausted.

2. Allow the previously boiled off cotton material to lie for 2 hours, or better still over night, in a bath containing sodium stannate 6—7° Tw. After wringing out pass through a bath containing 15—20 % alum or 7½—10 % sulphate of alumina and 2—3 % soda.

After a couple of hours wring out or rinse, and then dye luke warm with the respective quantity of acid colour.

3. Treat the cotton for 1 hour in a solution of stannic chloride 7½—9° Tw. wring out, and enter a bath containing acetate of alumina 6° Tw. for 1—2 hours. Afterwards rinse, and dye luke warm with the requisite quantity of Acid dyestuff.

The shades are very bright but are not fast to washing.

102. **Acid colours** which can be employed for **printing cotton** with **alumina mordant:**

Reds: Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Cochineal Scarlet PS
Croceine Scarlet 1B, 2B, 3B, 5B, 7B, 1BX, 2BX, R
Ponceau R, 2R, 3R, 2RL
Rhodamine B, G, S
Oranges: Croceine Orange G
Mandarine G
Orange GT, IIB, RO
Yellows: Quinoline Yellow
Blues: Alizarine Blue SAP, SAE in paste
New Victoria Blue B
Greens: Brilliant Acid Green 6B

General Recipe for Printing.

Dissolve:

6	oz.	or 30 grms.	**Acid Wool Colour** in
6 3/4	noggs.	» 170 »	water, thicken with
6	pints	» 600 »	acetic acid starch tragacanth thickening (R) and then add
1 1/2	»	» 150 »	acetate of alumina 18° Tw.
1/2	»	» 50 »	acetic acid 9° Tw. (30%)
		1000 grms.	

Print on unoiled cotton cloth, and afterwards steam for 1 hour without pressure. The prints are very bright but not fast to washing.

Wool.

103. **Acid wool colours,** which are adapted for the **dyeing of wool** in a **strongly acid** bath (2—5% sulphuric acid and 10—20% Glauber's salt crystals); these colours can also be **printed on wool:**

Reds: Acid Magenta
Azo Bordeaux
*Azo Cochineal
Azo Eosine, S L extra
Azo Fuchsine B, G, G N extra, S*, 6 B
*Azo Crimson L
Azo Crimson S
Azo Phloxine 2 G
Bordeaux B X, extra, G
Brilliant Croceine 3 B
Brilliant Double Scarlet 3 R
Brilliant Ponceau 4 R, 5 R
Carmoisine B, 3 B
Cloth Red B, 3 B extra, G, G extra, 3 G extra
Cochineal Scarlet P S
Croceine Scarlet 1 B, 2 B, 3 B, 5 B, 7 B, 8 B, 9 B, 10 B, R, 1 B X, 2 B X, 3 B X, R X
Crystal Ponceau 6 R
Double Ponceau 1 R, 2 R, 3 R, 4 R
Fast Red A, B T, E, N S
Fast Acid Magenta B
Imperial Scarlet B, 3 B
Metanil Red 3 B, 3 B extra
Orange R
Orseilline B B
Ponceau 1 R, 2 R, 3 R, 2 R L

Oranges: Croceine Orange G, R
Fast Light Orange G
Golden Orange
Orange II B, IV, G T, R O
Mandarine G

Yellows: Fast Light Yellow G, 3 G
Fast Printing Yellow 3 G
Fast Yellow, extra
Golden Yellow
Indian Yellow G, R

* Those dyestuffs marked with an asterisk are not particularly suited for printing.

Yellows: Metanil Yellow, conc.
Naphtole Yellow S, SE
New Yellow, extra concentrated
Tartrazine
Quinoline Yellow, extra

Greens: Acid Green, extra, 3 B, GB extra, GG extra, G extra, 6 B, BBN extra, BB extra in powder
Acid Green liquid, double, quadruple, quintuple liquid BB, liquid 6 B
Alkali Fast Green B, G
Brilliant Acid Green 6 B
Fast Green, extra, blue, extra blue, CR, W in powder
Fast Green liquid, blue liquid, extra blue liquid (treble and quintuple)
Fast Light Green in powder and liquid quintuple
New Acid Green 3 BX, GX powder and liquid quintuple
Parrot Green
Wool Green BS

Blues: Acid Cyanine B, R
Alizarine Blue COR
Alizarine Blue SAP, SAE, SAF in powder and in paste, SAC in powder
Alizarine Blue SKY powder
Azo Acid Blue 4 B, 6 B
Brilliant Blue extra greenish
Brilliant Wool Blue B extra, G extra
Carmine Blue B and G in powder and liquid
Fast Blue greenish
Fast Acid Blue B, B extra
Induline B, 3 B, R extra
Intensive Blue
Lazuline Blue R
Night Blue extra greenish
Navy Blue 115
New Patent Blue B, 4 B, GA
Red Blue extra concentrated
Victoria Blue B
Victoria Navy Blue B

Blues: Soluble Blue I greenish, 3B extra greenish, TRG, I reddish
Wool Blue BX, N extra, R extra, S, SR extra
Violets: Acid Violet 4B extra, 4BN extra, 5B, 8B extra, 4RS, 6BN, 6BN extra, 7B, R extra, 3R in powder, 5B liquid, HW, BW
Alizarine Blue JR in paste and in powder
Alkali Violet R, LR
Azo Acid Violet R extra, B extra, 4R
Fast Acid Violet 10B in powder, liquid and quintuple liquid
Victoria Violet 4BS
Greys: Nigrosine B, G
Blacks: Acid Black 5B*, 8B*, FL, 4BL, LD
*Acid Blue Black 3B
Acid Chrome Black B, G
Cashmere Black B, 6B, T
Naphtole Black 2B
*New Victoria Black B
*New Victoria Black Blue
*Phenol Black SS
Victoria Black B, G, 5G
Victoria Black Blue
**Wool Printing Black 21038
*Wool Black B, 4B, N4B

104. **Acid wool colours,** which are adapted for the **dyeing** of wool in a **slightly acid** bath (1—5% acetic acid); these colours can also be **printed on wool:**

Reds: Eosine S extra bluish, I bluish
Rhodamine B, G, 4G, S, B extra, G extra, S extra
Oranges: Eosine S extra yellowish, I yellowish
Yellows: Naphtylamine Yellow
Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder
Blues: Alizarine Blue NSG and NSG extra,
Alizarine Blue BRG and BR3G in paste and in powder afterwards add sulphuric acid)

* Those dyestuffs with **one** asterisk are not particularly suited for printing, whereas those colours marked with **two** asterisks are **only** adapted for printing

Blues: New Victoria Blue B
*Sulphon Acid Blue B, G, R
Blacks: *Naphthaline Acid Black 4B, S
Phenyl Blue Black N
*Phenylamine Black 4B, T

105. **Acid wool colours,** which dye **very easily level** with Glauber's salt and sulphuric acid, and are therefore adapted for the production of fashionable shades. **(Level dyeing colours):**

Reds: Acid Magenta
Azo Fuchsine G, S, GN extra, 6B
Azo Crimson L, S
Azo Phloxine 2G
Fast Acid Magenta B
Metanil Red 3B, 3B extra
Oranges: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB, RO
Yellows: Fast Light Yellow G
Fast Printing Yellow 3G in powder
Fast Yellow, extra
Indian Yellow G, R
Naphtole Yellow S, SE
Tartrazine (fairly good)
Greens: Acid Green BBN extra, 3B, 6B, GG extra, GB extra, BB extra, 225
Alkali Fast Green B, G
Brilliant Acid Green 6B
Fast Green bluish, extra bluish
Fast Light Green powder, liquid quintuple
New Acid Green 3BX, GX powder and liquid quintuple
Parrot Green
Wool Green BS
Blues: Alizarine Blue, SAP, SAE, SAC
Alizarine Blue BR3G (fairly good)
Azo Acid Blue 4B, 6B
Brilliant Wool Blue G extra
Fast Acid Blue B, B extra
Intensive Blue
New Patent Blue B, 4B, GA

Blues: Victoria Navy Blue
Wool Blue BX, S

Violets: Acid Violet 4B extra, 4BN extra, 5B (almost good), 3B extra (almost good), 6BN, 4RS, 8B extra
Alizarine Blue JR in paste and in powder
Azo Acid Violet 4R, R extra, B extra
Fast Acid Violet 10B
Victoria Violet 5B (almost good), 4BS

1. Dyeing.

a) Scouring of the Wool.

Before dyeing, the wool must be freed of all oil or grease, as the result of the dyeing depends much upon the state of the scoured wool.

Treat the wool in a warm bath containing 10% soda crystals and 2% soap; the temperature of this bath should never get above 110—120° Faht., and for wool that is easily liable to felt the temperature must be even kept below this. Afterwards rinse in warm water, containing just sufficient ammonia to make the bath smell of it; finally rinse in cold water. For piece goods, etc. it is quite sufficient, as a rule, to rinse in the washing machine containing water and a slight amount of ammonia.

For worsteds and cheviots the following method of scouring can be recommended: After milling, the pieces should be thoroughly washed, particular care being taken to remove all soap dirt, particles of resin, etc., by treating them in a bath containing about $2^1/_2-3^1/_2$ pints spirit of sal ammonia per piece of cloth, or for 4—6 pieces 10—14 pints. When the pieces are thoroughly saturated in the liquor for $^1/_4$ hour at 100° Faht. bring almost up to the boil slowly within $^1/_2$ hour, and treat the pieces for $^1/_2-^3/_4$ hour in the gently boiling liquor. The lime-soap on the surface of the liquor should be removed. Should after $^3/_4$ hour, no more scum (lime-soap) rise to the surface, then turn off steam and cool down gradually with cold water, allowing the pieces to run in the bath until it has entirely cooled down. Then empty the bath, and make up with fresh cold water, and rinse for 15 mins.

b) Dyeing of the Wool.

Enter the dye bath at 100—120° Faht. containing the requisite quantity of the previously well dissolved dyestuff, 10—20% Glauber's salt crystals and 2—5% sulphuric acid 169° Tw. (the latter considerably diluted with water), bring slowly to the boil, boil for 1 hour, then rinse well and dry. One can also dye with the addition of 10% bisulphate of soda. When a colour does not dye easily level the sulphuric acid should be added in 2 or 3 portions.

Slightly acid dyeing colours (See No. 104 page 165) are dyed with only the addition of 1—5% acetic acid.

When dyeing with the level dyeing colours under given under No. 105 on page 166 the respective colours can be added at the boil for shading purposes.

Colours which do not dye easily level should not be added at the boil. When dyeing cloth that is difficult to penetrate or when working with colours that do not dye easily level the following method will be found valuable and serviceable. Dye for ½ hour with the addition of 8—10% Glauber's salt crystals, acetate of soda or acetate of ammonia and afterwards add the acetic acid slowly; should the bath not be completely exhausted than add 1% sulphuric acid and boil for another ½—¾ hour.

2. Printing.

a) Bleaching and chlorinating of the Wool.

Acid colours develope better on wool that has been chlorinated before printing. First scour the wool in a soap bath at 95—105° Faht. (containing 3—5% olive oil soap) or in a diluted solution of carbonate of ammonia (1½%) for 15—20 mins. in order to remove any fat or grease contained in the wool. Then rinse, crab, steam, dry, singe and wet out in warm water.

Bleaching proper is often carried out in the stoving chamber, or the wool is passed through the continuous bleaching machine once or twice. Sometimes wool is bleached with aqueous sulphurous acid or with bisulphite of soda and hydrochloric acid, but better results are obtained by stoving.

Wool can also be bleached with peroxide of hydrogene by pouring the commercial product into 20 times as

much water, and adding sufficient spirit of sal ammonia to make the liquor slightly alkaline. Turn the wool in this liquor several times, allow the goods to remain in it all night, then wring out, acidulate slightly with diluted sulphuric acid, rinse well and dry.

Peroxide of soda can also be employed for bleaching purposes, e. g. 1 piece of woollen muslin, weighing about 7 1/2 lbs. is first wetted out in hot water, then run cold for 5 mins. in a vat containing 4 1/2 lbs. sulphate of magnesia per 44 gallons water, then lift the piece, and add to the bath in small portions, so as to avoid the bath getting warm, 23 oz. peroxide of soda under constant stirring, run the pieces for 1/2 hour, bring to 120—140° Faht. within 1/2 hour, allow to run for 1—3 hours, then acidulate with sulphuric acid and wash. Afterwards chlorinate in

55 gallons water
7 pints chloride of lime solution 18° Tw.
8 3/4 oz. hydrochloric acid 32° Tw.

Run for 1 hour and wash.

Hypochloride of soda oftentimes produces better results than chloride of lime. Sulphuric acid can be employed instead of hydrochloric acid, and it has the advantage that in steaming the pieces do not become so easily yellow, as is the case with hydrochloric acid. The pieces can be chlorinated full width in the continuous bleaching machine. This can be done by preparing a vat of about 45 gallons capacity containing about 44 gallons water, 5 1/4 pints chloride of lime solution 6° Tw. and 3 1/2 pints diluted hydrochloric acid (1 part hydrochloric acid to 4 parts water). The pieces are run through quickly, only coming intocontact with the liquor for a few seconds, and are then washed at once and dried. The chlore vapours must be drawn off by an exhaustor.

For small tests the following method will prove serviceable: take an enamel vessel containing 2 1/4 gallons water and 10 1/2 oz. hydrochloric acid 30° Tw., enter the wool and add gradually under constant stirring 8 3/4 oz. hypochloride of soda or chloride of lime solution 1 1/2° Tw. per 3 1/2 oz. wool; work in this liquor for 1 hour, wash well and dry.

b) Preparing of the wool with stannate of soda.

Most Wool dyestuffs produce brighter shades when printed on wool previously prepared with tin. Pad the previously cleaned and chlorinated woollen cloth, with a solution of stannate of soda 5—7° Tw., allow to remain in this liquor for ½—1 hour in the rolled up state, acidulate with sulphuric acid 1—1½° Tw. and wash. The above mentioned chlorinating process can now eventually be carried out, by treating the goods for 15 mins. in a bath prepared with 8 oz. chloride of lime per 10 gallons water and 10 lbs. sulphuric acid per 100 lbs. goods. Wash and dry.

Occasionaly the two processes are combined in such a manner that the material prepared with stannate of soda is after being allowed to lie for some time run through a bath, containing 1⅛ pints chloride of lime solution 12° Tw. and 9 oz. sulphuric acid 160° Tw. per 38—44 gallons water.

c) Print Pastes for woollen goods.

Gum, Dextrine, British gum, mucilage of tragacanth, etc. are employed as thickening agents for print pastes containing wool colours. Prepare the print pastes as follows: boil up the respective wool colour in the dissolving and thickening agents or the thickening paste can be prepared first and the colour solution added subsequently. Dissolving agents or ingredients to the print paste for wool colours are: water, acetic acid, tartaric acid, oxalic acid, lactic acid, acetine, glycerine, but more seldom sulphuric acid or acid sulphate, alum, acetate of alumina, oxalate of ammonia, chrome alum perchloride of tin, turpentine oil, etc.

General Recipe for Printing.

Boil:

3	oz.	or 30	grms.	**Acid Wool Colour**
1½	pints	» 300	»	British gum and
2¾	»	» 570	»	water, then add
½	»	» 100	»	acetic acid 9° Tw. (30%)

1000 grms.

The printed pieces should not be dried in the hot air drying chamber too much, as pieces that are quite dry come out very badly after steaming. An additon of glycerine to the print paste is therefore oftentimes

of much advantage. The printed pieces should be steamed for 1—2 hours with wet steam, and if possible in wet back-cloths. Sometimes the printed pieces are also allowed to lie rolled up in the wet back-cloths for a time before steaming; they are then rolled out and steamed; afterwards washed and dried.

106. **Acid dyeing wool colours,** which when **dyed** or **printed** on wool are remarkable for being **very fast to light:**

Reds: Azo Cochineal
Azo Fuchsine B, 6B, G, GN extra, S
Azo Phloxine 2G
Brilliant Ponceau 5R
Cochineal Scarlet PS
Croceine Scarlet 1B, 2B, 3B, 5B, 7B, 8B, 9B, 10B
Cloth Red B, G
Metanil Red 3B, 3B extra

Oranges: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB

Yellows: Fast Printing Yellow 3G
Fast Yellow, extra
Fast Light Yellow G, 3G
Tartrazine

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder

Blues: Acid Cyanine B, R
Alizarine Blue NSG, NSG extra in paste and in powder
Alizarine Blue SKY in powder and in paste
Alizarine Blue SAC in powder, SAP, SAE, SAF in powder and in paste
Alizarine Blue BR3G in paste and in powder
Sulphon Acid Blue B, G, R

Violets: Alizarine Blue JR in paste and in powder
Azo Acid Violet B extra, R extra, 4R

Blacks: Acid Black 4BL, LD
Acid Chrome Black B, G
Cashmere Black B, 6B, T

Blacks: Naphthole Black 2B
New Victoria Black B
New Victoria Black Blue
Phenylamine Black 4B, T
Phenyl Blue Black N
Victoria Black B, G, 5G
Victoria Black Blue
Wool Black B

107. **Acid** and **slightly acid wool colours** which are **fast to alkali** when either dyed or printed (resisting **20% ammonia:**

Reds: Azo Bordeaux
Azo Cochineal
Azo Fuchsine S
Azo Crimson S
Azo Phloxine 2G (fairly good)
Bordeaux BX
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 5R
Cloth Red B, 3G extra
Cochineal Scarlet PS
Croceine Scarlet 3B, 5B, 9B, 10B, BX, 2BX, 3BX (almost good), R, RX
Double Ponceau 1R, 2R, 3R, 4R
Eosine S extra bluish, I bluish
Fast Red A, BT, E, NS
Fast Acid Magenta B
Metanil Red 3B, 3B extra
Orange R
Ponceau 1R, 2R, 2RL, 3R
Rhodamine 4G

Oranges: Croceine Orange G, R
Eosine S extra yellowish, I yellowish
Fast Light Orange G
Mandarine G
Orange IIB, IV, RO

Yellows: Fast Yellow, extra
Fast Light Yellow G, 3G
Indian Yellow G (almost good), R
Metanil Yellow
Naphtole Yellow S

Yellows: New Yellow, extra concentrated
Quinoline Yellow, extra
Tartrazine

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder
Alkali Fast Green B, G
Fast Green bluish, extra bluish, W, CR
Fast Light Green liquid and in powder (almost good)

Blues: Alizarine Blue SAE in powder and in paste (fairly good)
Alizarine Blue SKY powder and in paste
Alizarine Blue BRG, BR3G
Brilliant Wool Blue B extra, G extra
Fast Acid Blue B, B extra (fairly good)
Intensive Blue (fairly good)
Lazuline Blue R
New Patent Blue B, 4B, GA (fairly good)
New Victoria Blue B
Sulphon Acid Blue B, G
Victoria Blue B
Wool Blue N extra, R extra, SR extra

Violets: Acid Violet 8B extra
Alizarine Blue JR in paste and in powder
Alkali Violet R, LR
Fast Acid Violet 10B

Blacks: Acid Black 8B, 4BL, FL, LD
Acid Blue Black 3B
Acid Chrome Black B, G
Cashmere Black B, 6B, T
Naphthaline Acid Black 4B, S
Naphthole Black 2B
New Victoria Black Blue
Phenol Black SS
Phenylamine Black 4B, T
Phenyl Blue Black N
Victoria Black B, G
Victoria Black Blue
Wool Black B

108. **Acid wool colours,** which when **dyed** or **printed** on wool are fast to **acid** (spotting with **mineral** acids, concentrated hydrochloric acid):

Reds: Azo Fuchsine S
Azo Crimson S (fairly good)
Cochineal Scarlet PS fairly good)
Yellows: Fast Light Yellow G
Blues: Brilliant Blue extra greenish
Induline R extra, 5R
Soluble Blue 3B extra greenish
Violets: Azo Acid Violet B extra, R extra, 4R
Alizarine Blue JR in paste and in powder
Blacks: Acid Black 5B, 8B
New Victoria Black Blue
Phenylamine Black 4B, T
Victoria Black B, G
Victoria Black Blue
Wool Black B

109. **Acid** and **slightly acid wool colours,** which when **dyed** or **printed** on wool are fast to **stoving:**

Reds: Azo Bordeaux
Azo Cochineal
Azo Eosine, SL extra
Azo Fuchsine B, G, S, GN extra
Azo Phloxine 2G
Bordeaux BX (almost good), extra
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R, 5R (fairly good)
Cochineal Scarlet PS
Croceine Scarlet 10B (fairly good)
Crystal Ponceau 6R
Double Ponceau 1R—4R
Fast Red BT
Fast Acid Magenta B
Eosine S extra bluish (fairly good)
Orseilline BB
Ponceau 2RL (fairly good)
Rhodamine B, G, S, B extra, G extra, S extra
Cloth Red B, 3B extra, 3G extra, G, G extra
Oranges: Croceine Orange G, R
Fast Light Orange G

Oranges: Mandarine G
Orange IIB, GT, RO

Yellows: Fast Light Yellow G, 3G
Indian Yellow G, R
Metanil Yellow (fairly good)
Naphtole Yellow S, SE
Naphtylamine Yellow
Tartrazine
Quinoline Yellow, extra

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder
Alkali Fast Green B, G
Brilliant Acid Green 6B
Orange IIB, GT, RO
Fast Green W, extra bluish
Wool Green BS

Blues: Alizarine Blue SAP, SAE, SAF in powder and in paste, C in powder
Alizarine Blue BRG, BR3G
Alizarine Blue SKY powder and paste
Brilliant Wool Blue B extra, G extra
Fast Acid Blue B, B extra
Induline B, R extra, 3B (almost good)
Intensive Blue
Lazuline Blue R
New Patent Blue B, 4B, GA
New Victoria Blue B
Victoria Blue B
Wool Blue N extra, R extra, BX, SR extra

Violets: Acid Violet 4B extra, 6BN, R extra, 5B, 8B extra, HW, BW
Alkali Violet R, LR
Alizarine Blue JR in paste and in powder
Azo Acid Violet 4R, B extra, R extra
Fast Acid Violet 10B

Greys: Nigrosine B, G

Blacks: Acid Chrome Black B, G
Cashmere Black B, 6B, T
New Victoria Black B
New Victoria Black Blue
Phenol Black SS
Phenylamine Black 4B, T

Blacks: Victoria Black B, G
Victoria Black Blue
Wool Black B, N4B

110. **Acid** and **slightly acid wool colours,** which when dyed or printed on wool are remarkably **fast to rubbing:**

Reds: Acid Magenta
Azo Bordeaux
Azo Cochineal
Azo Eosine, SL extra
Azo Fuchsine B, 6B, G, GN extra, S
Azo Crimson L, S
Azo Phloxine 2G
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R, 5R,
Carmoisine B
Cloth Red 3G extra
Cochineal Scarlet PS
Croceine Scarlet 1B, 2B, 3B, 5B, 7B, 8B, 9B, 10B, RX, 1BX, 2BX, 3BX, R
Crystal Ponceau 6R
Double Ponceau 1R, 2R 3R, 4R
Fast Red E, NS
Fast Acid Magenta B
Eosine I bluish
Imperial Scarlet 1B, 3B
Metanil Red 3B, 3B extra
Orange R
Orseilline BB
Ponceau 1R, 2R, 3R
Rhodamine B, G, B extra, G extra

Oranges: Croceine Orange G, R
Mandarine G
Orange IIB, GT, IV

Yellows: Fast Yellow extra
Fast Light Yellow G, 3G
Golden Yellow
Indian Yellow G, R
Metanil Yellow
Naphtylamine Yellow
Naphtole Yellow S, SE

Yellows: Quinoline Yellow, extra
Tartrazine

Greens: Acid Green 3 B, 6 B, BB extra, BBN extra, GB extra, G extra, GG extra, extra
Alizarine Green CE and CG extra in paste and in powder, CK in powder
Alkali Fast Green B, G
Brilliant Acid Green 6 B
Fast Green, extra, extra bluish, bluish, W
Fast Light Green liquid and in powder
New Acid Green 3 BX, GX powder and liquid quintuple
Parrot Green
Wool Green BS

Blues: Acid Cyanine B and R
Alizarine Blue SAP, SAE, SAF in powder and in paste, SAC in powder
Alizarine Blue SKY powder and paste
Alizarine Blue BR 3 G in paste and in powder
Azo Acid Blue 6 B
Brilliant Wool Blue G extra
Carmine Blue B, G
Cotton Blue IV
Fast Acid Blue B, B extra
Induline R extra, 3 B
Intensive Blue
Lazuline Blue R
New Patent Blue B, 4 B, GA
Sulphon Acid Blue G
Wool Blue BX, S
Victoria Navy Blue B

Violets: Alizarine Blue JR in paste and in powder
Azo Acid Violet B extra, 4 R, R extra
Victoria Violet 4 BS,

Blacks: Acid Black 8 B, FL, 4 BL, LD
Acid Blue Black 3 B
Cashmere Black B, 6 B, T
Naphtaline Acid Black S, 4 B
Naphtol Black 2 B
Phenyl Blue Black N

Blacks: Phenol Black SS
Phenylamine Black 4B, T
Victoria Black B, G
Victoria Black Blue B
Wool Black B, N4B

111. **Acid** and **weakly acid wool colours,** which when dyed on wool are **fast to water** by the side of **white wool:**

Reds: Bordeaux BX (fairly good), extra
Orseilline BB
Blues: Alizarine Blue AS
Brilliant Blue extra greenish
Fast Blue greenish
Induline 3B
Night Blue extra greenish
Navy Blue 115
Sulphon Acid Blue R
Soluble Blue I greenish, I reddish, TRG
Violets: Acid Violet R extra
Greys: Nigrosine B, G
Blacks: Acid Black 8B
Naphtole Black 2B
Naphthylamine Black 4B, 4BK
Phenylamine Black 4B
Wool Black N4B

112. **Acid wool colours,** which when **dyed** on wool are comparatively **fast to milling** by the side of **white wool:**

Reds: Cloth Red 3B extra, 3G extra
Greens: Brilliant Acid Green 6B
Fast Green extra (fairly good), CR, W
Blues: Induline 3B
New Patent Blue GA (fairly good)
New Victoria Blue B
Victoria Blue B
Violets: Alkali Violet R, LR
Fast Acid Violet 10B (fairly good)
Acid Violet 4B extra, 5B, 6BN, 6BN extra, 3R, 3R (after-chromed), BW
Blacks: Phenyl Blue Black N (fairly good)
Victoria Black B (fairly good)
Wool Black B (almost good)

113. **Acid wool colours,** which when **dyed** on wool are **fast to milling** by the side of **white cotton:**

Greens: Brilliant Acid Green 6B
Fast Green extra (fairly good), CR

Violets: Alkali Violet R, LR
Acid Violet 4B extra, 4BN extra

114. **Acid** and **weakly acid wool colours,** which when **dyed** on wool are **fast to carbonisation** (with sulphuric acid):

Reds: Azo Eosine, SL extra
Azo Fuchsine S
Bordeaux BX
Brilliant Double Scarlet 3R
Carmoisine B
Cloth Red B, 3B extra, G, G extra, 3G extra
Cochineal Scarlet PS
Croceine Scarlet 3B, 3BX
Crystal Ponceau 6R
Fast Red A, BT, E
Metanil Red 3B, 3B extra
Rhodamine B, B extra

Oranges: Croceine Orange G, R
Orange IIB, IV

Yellows: Fast Light Yellow G
Indian Yellow G, R
Naphtole Yellow S, SE
Quinoline Yellow, extra
Tartrazine

Greens: Alizarine Green CE and CG extra in paste and in powder
Fast Green bluish
Fast Green extra bluish

Blues: Alizarine Blue AS
Induline B, R extra (fairly good)
Night Blue extra greenish
Sulphon Acid Blue B, R

Violets: Acid Violet 4B extra
Fast Acid Violet 10B

Blacks: Acid Black 5B, 8B
Naphthylamine Black 4B
New Victoria Black B
New Victoria Black Blue (fairly good)

Blacks: Phenylamine Black 4B, T
Phenyl Blue Black N
Victoria Black B, G
Wool Black B

Carbonising of the Wool.

a) Loose Wool.

Before carbonising, the wool must be carefully cleaned and freed from any grease, then rinsed well. Sulphuric acid 6—8° Tw. (1.029—1.04 spec. grav.) is employed for acidulating, and the wool is allowed to lie in this bath for 2—3 hours, particular care being taken to work it constantly. Afterwards lift the goods and allow to drain, then hydro-extract in an hydro-extractor lined with lead, or run the wool through squeezing rollers. Dry the wool in the hot air chamber at 120° Faht., and then carbonise for a short time at 195—212° Faht. to destroy the cotton particles, burs and straw impurities.

After carbonising rinse in water, and if the wool has to be freed freed from acid, neutralise for ½ hour in a soda solution 4½—8° Tw. (1.022—1.037 spec. grav.) and then rinse well.

b) Woollen Cloth.

Wash the pieces well first (best for ½ hour luke warm with 1¾—2½ pints spirit of sal ammonia per piece added to the soap bath), then rinse well in clear water. Carbonising can be done in three different ways:

1. with sulphuric acid 6—9° Tw.
   (1.029—1.045 spec. grav.)
2. with aluminium chloride 9—12° Tw.
   (1.045—1.06 spec. grav.)
3. with magnesium chloride 15° Tw.
   (1.075 spec. grav.)

The impregnating with sulphuric acid (Recipe 1) is done by running the woollen pieces for 1—2 hours in a vat. Method Nos. 2 and 3 should only be carried out in the washing machine or rinsing vessel (as the rather greasy substance does not very easily penetrate the woollen cloth). Run the wet material for 20—25 mins. and hydro-extract the well penetrated goods in an hydro-extractor lined with lead. If only copper hydro extractors are at disposal then wrap the pieces

up in an old piece of cloth. After the pieces are hydro-extracted they are again opened out full width, and especially in Summer covered up carefully, so that the edges do not become dry, whereby light stripes subsequently ensue. Then, if possible without allowing to lie too long, dry in the carbonising stove or hot air drying chamber, first at 120° Faht., and then when the goods are dry, at 195—212° Faht.

After carbonising remove the acid by rinsing for 20—30 mins. in cold water, and subsequently neutralise in soda solution in the same manner as stated before for loose wool, then wash well. After drying in the carbonising stove the pieces are sometimes subjected to an old cylinder milling and allowed to run for some time dry, in order to remove any burs, particles of cotton and other impurities. After carbonising with aluminium chloride the goods are best washed with Fuller's earth, so as to remove any alumina still present in the wool. If the cotton lists are to remain unaffected, then after carbonising brush on silicate of soda 15° Tw. or soda and chalk. Silicate dries very quickly, and only adheres to those parts treated with it, and does not run into the material.

115. **Acid Wool Blacks** which when dyed on wool are particularly fast to **steaming:**

Acid Black 5B, 8B, 4BL, FL, LD
Acid Blue Black 3B
Acid Chrome Black B, G
Cashmere Black B, 6B, T,
Phenylamine Black 4B, T
Victoria Black B
Wool Black B

Singeing, Crabbing and Steaming of Woollen Cloth.

Singeing: Almost all smooth surface woollen cloths are first singed, the object of which is to remove the superfluous threads or hairs on the surface of the material. Woollen pieces are singed or gased by means of gas- or plate-singeing machines.

Crabbing: After singeing, most woollen cloths are »crabbed«. The object of crabbing is twofold, firstly to cause the setting of the piece in such a manner that it does not cockle in the subsequent treatments of

washing, dyeing, etc., secondly to impart a fine durable lustre, that will stand the subsequent treatments. In crabbing the pieces are drawn full breadth and under tension through warm or boiling water, and the beaming of the material is done with or without pressure according to the nature of the material. Fine qualities, which should have a soft and full handle are crabbed without pressure and only in water of 120 – 140° Faht., whereas cloth of very hard wool, which easily breaks in washing and dyeing, must be crabbed in boiling water, so that the fibre is sufficiently stretched. Crabbing without great pressure is done on special rollers, whereas for high pressure the crabbing machine is employed. After crabbing the pieces are beamed on a wooden roller and allowed to cool down. When they are cooled down the pieces are washed, either in the rope or full width, in soap and soda, or spirit of sal ammonia in a bath at about 95° Faht. Then material, which should have a full and soft feel is crabbed once more, whereas hard material, such as cheviots, etc., has to be steamed in order to avoid cockling of the fibre and to impart a soft handle and fine lustre.

Steaming: After crabbing, the tightly rolled up cloth is steamed. The roller on which 3—6 pieces are beamed is a perforated iron or copper cylinder wrapped in several layers of cotton cloth or linen. The beamed pieces are enveloped in canvas, the ends of which are tied up tightly, and steam at 7½ – 29 lbs. pressure is admitted through the bottom axis until it has traversed the whole thickness of the layer of material, which generally takes about 5—8 mins. After the first steaming, the pieces are allowed to cool in the beamed state, (the cooling down being often accelerated by means of air suction), the object of which is to give the goods a more pronounced lustre. They are then drawn under tension on to another perforated cylinder and steamed again. In this manner those portions of the piece which were further away from the centre, (where the temperature is greatest) come nearest the centre, and the effect of the steaming is more even. The position of the cylinders in steaming

may either be vertical or horizontal. Steaming can also be done by diminished pressure (vacuum steaming)*.

It is advisable to steam the goods always before dyeing, and afterwards to steam only slightly, as by this method the best results are obtained; steaming before dyeing, provided it has been carried out correctly, has the effect of producing more level shades.**

Remarks: *After each steaming (especially when employing vertical rollers) it is absolutely necessary to place the rollers horizontally, on no account vertically or slanting, on a couple of high stools or some other arrangement, and turn the rollers for about $^1/_4 - ^1/_2$ hour, so as to produce a uniform cooling down.

** If the steaming is not carried out properly and with precaution, especially when the second steaming is omitted and the goods having been steamed on vertical cylinders, the goods are liable to become »ended«, or large patches, indiscernible before dyeing, ensue, which result from condensation. These indiscernible defects in the steaming process are generally attributed to the dyer, as such faults only appear after the goods are dyed.

This is especially the case with Cheviots, which often contain two different kinds of yarn, such as a hard tightly twisted worsted warp and a loose weft. Such kind of goods are very much inclined to show uneven penetration.

Potting: Gentlemen's heavy suitings, especially broadcloth, are often subjected to a particular finishing process in order to produce a peculiar gloss and handle. This potting process is carried out as follows:

The steam cylinder is placed into a machine with reversible driving gear, and through the hollow shaft of the cylinder water or steam or both can be drawn through the goods. After washing and brushing (without drying) the pieces are beamed on the cylinder in the well known manner, and same is inserted in the potting machine; then cold water is first forced through the goods, and after a time, steam. The admission of steam to the water takes place before it enters the cylinder, the temperature of the water is increased gradually and finally it is almost boiling. Pump boiling water through

for 2—3 mins., then turn off steam, and cool down with cold water until the material is completely cold.

For broad cloth, which has to receive a fine gloss and soft handle, the following process is resorted to: At first force steam for 15—20 mins. through the goods, turn off steam, and pump water through, when a fine gloss is obtained. Hot water is pumped through the goods again, so that the handle is not too hard. After pumping hot water through the goods, force air through them and unroll.

116. **Acid** and **slightly acid** dyeing colours which when dyed on wool yield **fluorescent** shades:

Reds: Azo Phloxine 2G
Rhodamine G, G extra, B, B extra
Rhodamine Scarlet G
Yellows: Fast Yellow extra
Fast Light Yellow G, 3G
Violets: Acid Violet 6BN

Dye for ¾ hour at the boil with the addition of 10—15 % bisulphate of soda, and then add 1½—2 % sulphuric acid to exhaust the bath better, and continue boiling for another ⅛ hour.

117. The following is a list of **wool colours,** which when **dyed on wool can be discharged** with **tin crystals:**

Reds: Azo Bordeaux
Azo Cochineal
Azo Eosine, SL extra
Azo Fuchsine B, G, S, GN extra, 6B
Azo Crimson L, S
Azo Phloxine 2G
Bordeaux BX, extra
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 5R
Carmoisine B, 3B
Cloth Red B
Cochineal Scarlet PS
Croceine Scarlet 1B, 2B, 3B, BX, 2BX, 3BX, 5B, 7B, 8B, 9B, 10B, R, RX
Crystal Ponceau 6R
Double Ponceau 1R, 2R, 3R, 4R

Reds: Fast Red A, E, BT, NS
Fast Acid Magenta B (yellowish)
Metanil Red 3B, 3B extra
Orseilline BB
Ponceau R, 3R
Orange R

Oranges: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB, IV, RO

Yellows: Fast Yellow, extra
Indian Yellow G (moderately well)
Indian Yellow R (slightly better)
Metanil Yellow (moderately well)
New Yellow, extra concentrated

Blues: Azo Acid Blue 4B, 6B
Sulphon Acid Blue B, R and G (yellowish)
Victoria Navy Blue B (greenish)

Violets: Azo Acid Violet B extra, 4R, R extra
Victoria Violet 4BS

Blacks: Acid Blue Black 3B
Acid Black 5B, 8B, 4BL, LD (cream)
Cashmere Black 6B (greenish-blue), B (yellowish-green), T (olive)
Diamond Black F, NG (yellow)
Naphtole Black 2B, (brownish)
New Victoria Black Blue (yellow)
New Victoria Black B (yellow)
Phenylamine Black 4B, T (cream)
Phenyl Blue Black N (cream)
Victoria Black B (yellow)

General Recipe for White Discharges.

5	pints or 500 grms.		acetic acid starch tragacanth thickening (A)
2½ lbs.	» 200	»	tin crystals
1 pint	» 100	»	Methyl Violet 2B solution 0.3 : 1000
1 »	» 100	»	water
1¼ lbs.	» 100	»	acetate of soda
	1000 grms.		

Print the pieces with the above print paste, steam for 20 minutes without pressure, wash and dry.

118. The following is a list of **wool colours**, which **are not dischargeable** with **tin crystals** and are therefore adapted for **colour discharging** with **tin crystals:**

Reds: Acid Magenta
Eosine S extra bluish
Rhodamine B, G, S, B extra, G extra, S extra
Rhoduline Red B, G
Saffranine FF extra

Oranges: Eosine S extra yellowish
Phosphine N

Yellows: Quinoline Yellow, extra

Greens: Acid Green, extra, BB extra, 3B, 6B, BBN extra, G extra, GB extra, GG extra
Alkali Fast Green B, G
Brilliant Acid Green 6B
Fast Green bluish, extra bluish, CR, W
Fast Light Green
New Acid Green 3BX and GX powder and liquid quintuple
Wool Green BS

Blues: Brilliant Wool Blue B extra, G extra
Carmine Blue B, G
Fast Acid Blue B, B extra
Intensive Blue
Methylene Blue BB
New Patent Blue 4B, GA
Red Blue extra concentrated
Soluble Blue 3B extra greenish, I greenish
Victoria Blue B
Wool Blue N extra, R extra, SR extra

Violets: Acid Violet 4B extra, 4BN extra, 5B, 6BN, 8B extra, 7B, HW, R extra, BW
Alizarine Blue JR in paste and in powder
Fast Acid Violet 10B
Methyl Violet 1B—7B, RB, 1R—5R

a) General Recipe for Colour Discharges on woollen cloth.

Dissolve:

3 oz.	or	30 grms.	**undischargeable colour** in
$1\,^{1}/_{6}$—$^{9}/_{10}$ pint	»	230—180	»	water, thicken with
$2\,^{3}/_{5}$ »	»	530	»	gum solution 1 : 1, and then add
15—20 oz.	»	150—200	»	tin crystals
6 »	»	60	»	acetate of soda
		1000 grms.		

Acetate of soda, which is added to retain the good condition of the wool in steaming, may be omitted in the above print paste. Gum solution can be substituted by mucilage of tragacanth 65 : 1000, in which case the acetate of soda must be omitted, as otherwise the printing paste would lose its consistency.

Steam the woollen pieces, printed with colour discharge, for 20 mins. without pressure, wash and dry.

For colour discharges on woollen yarn dilute the gum solution with half the quantity of water, and also reduce the quantity of tin crystals to about 12 oz. or 120 grms. resp.

b) General Recipe for Colour Discharges on woollen yarn.

Dissolve:

3 oz.	or	30 grms.	**undischargeable colour** in
$2\,^{3}/_{4}$—$2\,^{1}/_{2}$ pints	»	555—500	»	water, thicken with
$1\,^{1}/_{4}$ »	»	250	»	gum solution 1 : 1, add
12—$17\,^{1}/_{2}$ oz.	»	120—175	»	tin crystals, then add
$4\,^{1}/_{2}$ »	»	45	»	acetate of soda
		1000 grms.		

Steam according to the size of the design, for 3 — 20 mins. without pressure, wash and dry.

119. Acid and weakly acid **wool colours,** which when **dyed** on wool, can be **discharged** with **zinc powder:**

Reds: Acid Magenta
Azo Bordeaux
Azo Cochineal

Reds: Azo Crimson L, S
Azo Eosine, SL extra
Azo Fuchsine B, G, S, GN extra, 6B
Azo Phloxine 2G
Bordeaux BX, extra
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 5R
Carmoisine B, 3B
Cloth Red B
Cochineal Scarlet PS
Croceine Scarlet 1B, 2B, 3B, 5B, 7B, 8B, 9B, 10B, BX, 2BX, 3BX, R, RX
Crystal Ponceau 6R
Double Ponceau 1R, 2R, 3R, 4R
Fast Red A, E, BT, NS
Fast Acid Magenta B (yellow)
Metanil Red 3B, 3B extra
Orange R
Orseilline BB
Ponceau R, 2R, 3R
Rhodamine 4G

Oranges: Croceine Orange G, R
Fast Light Orange G (fairly easily)
Mandarine G
Orange IIB, IV, RO

Yellows: Fast Yellow, extra
Fast Light Yellow G (moderately well), 3G
Indian Yellow G (moderately well)
Indian Yellow R (slightly better)
Metanil Yellow (moderately well)
New Yellow, extra conc.
Tartrazine

Greens: Acid Green BBX extra, 3B, GG extra
Alkali Fast Green B, G
Brilliant Acid Green 6B
Fast Green bluish, extra bluish, CR, W
Fast Light Green in powder and liquid quintuple
New Acid Green 3BX, GX powder and liquid quintuple
Wool Green BS

Blues: Alizarine Blue AS (yellow)

Blues: Alkali Blue 6B—IB, IR—6R extra
Anthracyanine DL, BL, FL and 3FL (red)
Azo Acid Blue 4B, 6B
Brilliant Wool Blue B extra, G extra
Carmine Blue, B, G (fairly good)
Fast Acid Blue B, B extra
Intensive Blue
New Patent Blue B, 4B, GA
Sulphon Acid Blue B and G and R (yellow)
Victoria Navy Blue (cream)
Wool Blue N extra, R extra, SR extra

Violets: Acid Violet 5B, 4B extra, 6BN extra, 8B extra, 6BN, 1R extra, 4RS, 7B, BW, HW
Alizarine Blue JR in paste and in powder (yellow)
Azo Acid Violet 4R, R extra, B extra
Fast Acid Violet 10B
Victoria Violet 4BS

Blacks: Acid Black 5B, 8B, 4BL, LD (greenish)
Acid Biue Black 3B (rather well)
Cashmere Black B, 6B, T (cream)
Naphthole Black 2B (reddish)
New Victoria Black Blue (brown)
New Victoria Black B (brown)
Phenylamine Black 4B, T (greenish)
Phenyl Blue Black N (rather well)
Victoria Black B (brown)

The process of working and discharge recipe are exactly the same as stated under No. 26 page 50. Occasionally a little glycerine or ammonia is added to the print paste. After printing and drying, steam the wool for 1 hour without pressure, run through a bath slightly acidulated with hydrochloric acid, wash and dry.

120. The following **colours** are **not destroyed** by **zinc powder** or **bisulphite** and are therefore adapted for **colour discharging** with **zinc powder:**

Reds: Rhoduline Red B, G
Saffranine FF extra

Oranges: Coriphosphine O, OX, OX extra

Yellows: Quinoline Yellow, extra

Blues: Induline B, 3B, R extra
Methylene Blue BB

General Recipe for Colour Discharges.

Dissolve:

3/5 — 3 oz.	or	6 — 30 grms.		**undischargeable colour** in
5/8 — 1/2 pint	»	124 — 100	»	water, warm up with
1 1/2 »	»	300	»	gum solution 1 : 1, add
30 oz.	»	300	»	zinc powder (best quality); then add, whilst cooling down on an ice bath,
1 1/4 pint	»	270	»	sodium bisulphite 66° Tw.
		1000 grms.		

Steam for 1/2 — 1 hour without pressure, if necessary, acidulate slightly, wash and dry.

120a. **Acid colours** which when dyed on **wool** are dischargeable with **Hydrosulphite NF:**

Reds: Acid Magenta (easily)
Azo Bordeaux (easily)
Azo Cochineal (easily)
Azo Eosine (readily enough) (reddish)
Azo Fuchsine B (fairly easily) (creme), 6 B (easily) S (yellowish), G (fairly easily)
Azo Crimson L (fairly easily), S (fairly easily)
Azo Phloxine 2 G (easily)
Bordeaux B X (readily enough) (brownish)
Bordeaux extra (readily enough) (brownish)
Brilliant Double Scarlet 3 R (readily enough)
Brilliant Ponceau 5 R (readily enough) (yellowish)
Carmoisine B (fairly easily)
Cochineal Scarlet PS (easily)
Croceine Scarlet 7 B (fairly easily) (yellowish), 10 B (easily), 2 B (easily), 3 B X (easily), 9 B (fairly easily)
Fast Red B T (readily enough) (reddish), N S (readily enough), E (readily enough)
Metanile Red 3 B, 3 B extra (fairly easily)

Oranges: Croceine Orange G and R (readily enough)
Orange II B (readily enough)

Yellows: Fast Yellow extra (very easily)
Fast Light Yellow 3 G (fairly easily)
Indian Yellow G and R (readily enough)
Metanile Yellow (easily)

Yellows: New Yellow, extra concentrated (easily)
Tartrazine (fairly easily)
Greens: Alizarine Green SS (fairly easily)
*Brilliant Acid Green 6B (fairly easily)
*Fast Green CR (fairly easily)
*New Acid Green GX and 3BX (easily)
*Acid Green 3B, BBN and GG extra (easily)
Blues: Alkali Blue 1B—6B (easily), 1R—6R extra (easily)
Azo Acid Blue 6B (fairly easily)
*Brilliant Wool Blue B extra (fairly easily)
*Carmine Blue B and G (easily)
*Fast Acid Blue B (fairly easily)
*Intensive Blue (fairly easily)
*Soluble Blue I greenish (easily)
*Wool Blue N extra (readily enough)
Violets: Azo Acid Violet B extra, R extra and 4R (readily enough)
*Acid Violet 7B and 3R (fairly easily)
Victoria Violet 4BS (middling)
Browns: Azo Acid Brown (fairly easily)
Blacks: Victoria Black B and G (moderately well)

120b. **Colours** which are suitable **in conjunction with Hydrosulphite NF** for **colour discharges** on wool material:

Reds: Eosine S extra bluish
Rhodamine B, B extra, G, G extra
Oranges: Coriphosphine O
Eosine S extra yellowish
Yellows: Auramine O
Quinoline Yellow
Blues: Fram Blue G
Lazuline Blue R

121. **Acid** and **weakly acid wool colours,** which are employed for **dyeing slubbing** in **machines:**

Reds: Azo Crimson S
Cloth Red 3B extra, 3G extra
Croceine Scarlet 2B, 3BX

* The discharges on some Triphenylmethan dyestuffs, namely those marked with an asterisk, sometimes become coloured again when exposed to the action of the atmosphere, so it is advisable to employ them for colour discharges.

Reds: Double Ponceau 4R
Fast Red A
Rhodamine B, B extra
Oranges: Orange IIB
Yellows: Fast Yellow, extra
Indian Yellow G
Naphtol Yellow S
Quinoline Yellow
Greens: Acid Green 3B, GG extra
Alizarine Green CK
Brilliant Acid Green 6B
Fast Green CR, extra, bluish
Blues: Alizarine Blue SAP
Alizarine Blue BR3G
New Patent Blue B, 4B, GA
New Victoria Blue B
Sulphon Acid Blue R
Wool Blue N extra
Violets: Acid Violet 4B extra
Azo Acid Violet R extra
Fast Acid Violet 10B in powder and liquid quintuple
Blacks: Acid Chrome Black B, G
Naphthaline Acid Black 4B
New Victoria Black B
Phenylamine Black 4B
Victoria Black B
Wool Black N4B

Slubbing should always be quite clean before dyeing; if it is not sufficiently clean either scour for 1—2 hours in hot water or if it is too greasy, work in luke warm water containing 1—3 % soda ash or ammonia, and finally wash well again.

As slubbing dyed in the rope form is easily liable to get matted in dyeing, it is best dyed in the form of bobbins in machines. Only soft water should be employed, and in order to obtain good penetration of the colour boil up first in a neutral bath, adding the necessary quantity of acid in several portions.

122. **Acid** and **weakly acid wool colours**, which are adapted for **slubbing printing:**

Reds: Azo Fuchsine G, 6B
Croceine Scarlet 7B
Double Ponceau 4R
Rhodamine B, G, B extra, G extra
Rhodamine 5G, 4G

Yellows: Fast Light Yellow G, 3G
Fast Yellow, extra
Tartrazine

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder
Alkali Fast Green B, G
Brilliant Acid Green 6B
Fast Green bluish, W, CR
Fast Light Green in powder and liquid quintuple
Wool Green BS

Blues: Alizarine Blue SAP and SAE in powder and in paste, SAC in powder
Alizarine Blue SKY in paste
Alizarine Blue BRG and BR3G in paste and in powder
Brilliant Wool Blue B extra, G extra
Induline B
New Patent Blue B, 4B, GA
Sulphon Acid Blue B, G, R
Wool Blue N extra, R extra

Violets: Acid Violet 5B, 7B, 8B extra, 3R, BW
Alizarine Blue JR in paste and in powder
Alkali Violet R, LR
Fast Acid Violet 10B

Greys: Phenylamine Black 4B, T
Victoria Black B

Blacks: Acid Chrome Black B, G
Phenylamine Black 4B, T
Victoria Black B

The object of printing the slubbing is to avoid stripes, which so easily occur in melanges either with or without white, in the material prepared from it, and in this manner obtain a more uniform mixture.

The well opened, dyed or undyed slubbing ropes are printed in stripes with chased rollers. The broader and nearer the stripes are to one another the darker the melange and the narrower and farther apart they are from one another the lighter the melange.*)

For ladies' dress material it is better to employ Acid or Benzidine colours instead of Mordant dyestuffs, the latter being more adapted for gentlemen's wear.

Although all colours (especially Alizarines) produce fuller and faster shades on chlored than on unchlored slubbing, most manufacturers refrain from previously chloring the slubbing as the material is easily somewhat affected in spinning and milling by this treatment, the white being very liable to become yellow, and apart from this one manipulation less.

Before dyeing or printing, the slubbing is cleaned well in machines containing a weak ammonia solution, so as to remove any grease and soap, which may still be present from the washing, carding and back-washing, then rinsed well again and dried.

Slubbing is chlored in machines, the slubbing being rolled up in bobbins. For 100 lbs. slubbing take about 150 gallons cold water, 2½ gallons chloride of soda solution 6° Tw. and 2½ lbs. sulphuric acid 166° Tw. (diluted). The addition of chloride of soda and sulphuric acid can be made in several portions, so that the process is completed in about 20 mins.; afterwards wash well and dry.

Print pastes for slubbing should not be too thick; the thickening agents employed being mucilage of tragacanth, dextrine, burnt farina, British gum, traganthine, salepite, etc., in fact all such substances which are easily removed from the fibre by washing.

The most important operation in slubbing printing is »steaming«. Prints on woollen pieces are dried before steaming, whereas printed slubbing is not dried prior to steaming, but steamed wet for 1—1½ hours with or without pressure.

*) Remarks: For very dark shades mix the printed slubbing with slubbing dyed the same shade, as in printing, one cannot get beyond a certain depth of shade.

From practical experience it has been ascertained that it is more advantageous not to wash the printed slubbing immediately after steaming, but to allow it to lie for some time or better over night, as the colour is then fixed better. The printed slubbing is either washed in warm water at 85—105° Faht. in 3 or 4 different boxes, to the last one of which 1 oz. soda is added per 6 gallons of water, or the slubbing is treated in the back-washing machine containing luke warm soap solution, 100—120° Faht., (1 oz. soap per 6 gallons water), then washed, dried and run through the gill box several times. A uniform melange is obtained by combing the slubbing, and such material when spun into yarn never produces stripes in the pieces woven from such yarn.

General Recipe for Printing Slubbing with Acid Colours.

Boil:

3	oz.	or 30	grms.	**acid colour**
1 1/2	pints	» 300	»	British gum and
2 7/8	»	» 570	»	water, add
1/2	»	» 100	»	acetic acid 9° Tw. (30%)
		1000	grms.	

Steam the printed slubbing for 1 hour without pressure, wash and dry. The print paste can of course also be prepared with the previously boiled British gum water, to which the colour solution is added. Many acid colours, such as Fast Green, Fast Acid Violet, Acid Violet, etc. are rendered somewhat faster to washing, by adding 3 oz. chrome alum dissolved in 2 noggins water per 5 pints print paste.

128. **Acid wool colours,** which are adapted for **dyeing ladies' hat bodies** (woollen hats):

Reds: Azo Fuchsine G, S
Azo Crimson L
Azo Phloxine 2 G
Bordeaux extra
Croceine Scarlet 3 B
Fast Red A, BT, NS
Ponceau 2 R
Rhodamine B, G, B extra, G extra

Oranges: Croceine Orange G

Oranges: Mandarine G
Orange IIB
Yellows: Fast Light Yellow G
Fast Yellow, extra
Indian Yellow G, R
Naphtole Yellow S
New Yellow, extra concentrated
Quinoline Yellow, extra
Greens: Acid Green GG extra, GB
Fast Green bluish, CR
Fast Light Green in powder and liquid quintuple
Wool Green BS
Blues: Acid Cyanine B
Alizarine Blue AS
Alizarine Blue SAE
Anthra Cyanine FL, BL, DL, 3FL
Fast Acid Blue B, B extra
Intensive Blue
New Patent Blue B, 4B, GA
Victoria Navy Blue
Wool Blue N extra, R extra
Violets: Acid Violet 8B extra, 4B extra, R extra, BW
Alizarine Blue JR
Azo Acid Violet 4R, 4RS, R extra, B extra
Fast Acid Violet 10B
Victoria Violet 4BS
Browns: Acid Anthracene Brown R
Blacks: Acid Black FL, 4BL, LD
Naphtol Black 2B
Naphthaline Acid Black 4B, S
Naphtylamine Black 4B, 4BK
New Victoria Black B,
New Victoria Black Blue
Phenol Black SS
Phenylamine Black 4B, T
Victoria Black B
Wool Black B, N4B

As the demands for fastness of colour on ladies' hats are generally not so high as for gentlemen's, Acid and not Mordant colours are generally employed for the former. The fully planked hats are boiled in water

for 20 mins. before dyeing, rinsed slightly and hydro-extracted. It is very important to employ colours which penetrate well and are sufficiently fast to alkalies.

a) Directions for dyeing acid planked hats, or acid milled hat bodies carbonised and afterwards neutralised, or milled merely with soap.

Dye with the requisite quantity of thoroughly dissolved dyestuff with the addition of 15% Glauber's salt crystals and 2—4% sulphuric acid, or 10% Glauber's salt crystals and 5—10% bisulphate of soda. Enter the well wetted out goods at 120° Fahr., work for ¼ hour at this temperature, raise to the boil within ½ hour, and boil for 1 hour, care being taken not to boil up too severly, as the hat bodies are affected thereby; also do not handle too much. If the bath is not exhausted, add 1—2% sulphuric acid or 2—5% bisulphate of soda. When dyeing hats that are difficult to penetrate it is advisable to add only half the amount of acid at the beginning together with 3% borax, and to add the remaining quantity of acid in two portions after boiling for ½ hour, so as to produce a perfect penetration of the colour. (Borax has the effect of making the hard planked hats softer or more porous, thus causing the colour to penetrate better). After dyeing, rinse well.

Another method of dyeing is as follows: prepare the dye bath with the requisite quantity of colour and sufficient acetic acid to make the bath just acid. Enter the goods luke warm, work the hats (inside out) for ¼ hour without steam, and then bring slowly to the boil; after boiling for ½ hour turn the hats, add 2% sulphuric acid in 2 or 3 portions and boil for another ¾ hour.

b) Directions for dyeing carbonised half-planked hats acid milled, or acid milled carbonised hat bodies that have not been neutralised.

Enter such goods at 100° Fahr. into the dye bath containing 5% borax, bring slowly to the boil and boil gently for 1 hour. The addition of 5% borax neutralises only as much free acid as is in excess. An addition of acid is in most cases not necessary.

Despite the presence of borax, the dye baths exhaust well when dyeing un-neutralised hat bodies.

124. **Acid** and **weakly acid wool colours,** which are adapted for the **dyeing** and **printing** of **woollen carpet yarn:**

Reds: Acid Magenta
Azo Fuchsine B, G, S, GN extra, 6B
Azo Crimson L, S
Azo Eosine
Azo Phloxine 2G
Bordeaux extra
Brilliant Croceine 3B
Carmoisine B
Cochineal Scarlet PS
Croceine Scarlet 3BX
Double Ponceau 4R
Eosine S extra bluish
Fast Acid Magenta B
Fast Red A, E, NS
Orange R
Orseilline BB
Ponceau 2R, 3R
Rhodamine B, G, B extra, G extra

Oranges: Croceine Orange G, R,
Eosine S extra yellowish
Fast Light Orange G
Golden Orange
Mandarine G
Orange IIB

Yellows: Fast Light Yellow G, 3G
Fast Yellow, extra
Indian Yellow G, R
Naphtole Yellow S, SE
Quinoline Yellow, extra
Tartrazine

Greens: Acid Green, extra, GG extra
Alizarine Green CE and GG extra in paste and in powder, CK in powder
Alkali Fast Green B, G
Brilliant Acid Green 6B
Fast Green bluish (liquid), extra bluish
Fast Light Green in powder and liquid quintuple

Greens: Wool Green BS
Blues: Alizarine Blue COR
Alizarine Blue SAP, SAF, SAE in paste and in powder, SAC in powder
Alizarine Blue BRG, BR3G in powder, and in paste
Anthra Cyanine DL, BL, FL, 3FL
Azo Acid Blue 4B
New Patent Blue B, 4B, GA
Wool Blue N extra, R extra
Violets: Acid Violet 4B extra, 5B, 8B extra, BW
Alizarine Blue JR in paste and in powder
Azo Acid Violet B extra, R extra, 4R
Fast Acid Violet 10B
Blacks: Acid Black 5B
Naphthaline Acid Black 4B
Naphtole Black 2B
Victoria Black B
Wool Black N4B
Wool Printing Black 21038

The Dyeing of Yarns.

a) Scouring of the yarns.

Woollen yarns are scoured either in the manner described under No. 105, page 167 or as stated below for woollen yarn printing.

b) Yarn Dyeing.

Dye the well scoured woollen yarn for 1 hour at the boil with the requisite quantity of colour (easily level dyeing colours are employed especially for this class of work) and the addition of:

10% Glauber's salt crystals and
2—5% sulphuric acid 166 Tw.

(The latter percentages refer to standing baths, and for fresh baths take as a rule 2% Glauber's salt and 1% sulphuric acid more. For colours that do not dye easily level take 10% Glauber's salt and 5% acetate of ammonia. In order to exhaust the bath completely add subsequently 1—2% acetic acid 9° Tw., previously diluted.

Printing of Yarns.

a) Scouring of the yarns.

Before printing the yarns must be thoroughly scoured the same as in dyeing, and all grease and oil, with

which the wool has been treated to make it softer for the purpose of spinning, must be carefully removed.

The print paste is properly developed and fixed only on clean wool.

The yarn is first of all thoroughly wetted out in warm water at 120° Faht. It is best to steep in boiling water, over night, then wash in luke warm water containing:

3 ½ lbs. ordinary or soft soap and
1 » carbonate of ammonia

per 100 lbs. of yarn, then rinse well once or twice in luke warm water and hydro-extract. In order to remove any soap residue still contained in the yarn add a little ammonia if necessary to the first rinsing bath.

Woolen yarns are not only bleached before printing but are afterwards sometimes blued with Methyl Violet.

Bleaching was formerly done exclusively by means of gaseous sulphurous acid in the stoving chamber or in baths containing bisulphite of soda or hydrochloric acid, e. g. allow the wool to lie for 12—15 hours in a bath of bisulphite of soda solution 32° Tw., and enter the hydrochloric acid bath 6° Tw. without previous washing.

Peroxide of hydrogene has been lately employed to advantage for the bleaching of woollen yarn. The pieces are drawn full breadth through peroxide of hydrogene of 12 volumes diluted, according to quality of the yarn, with 2—10 times its volume of water and containing just a little ammonia to make it alkaline. After this treatment allow the yarn to lie for about 20 hours, then wash and run through a bath of bisulphite of soda 64° Tw., also diluted with 2—10 times its volume of water; afterwards acidulate and finally rinse well.**)

The bleaching of woollen yarns with peroxide of soda, instead of peroxide of hydrogene, is carried out in the following manner: allow the yarn to lie for 4—5 hours in a bath containing ½—1% peroxide of soda (See under No. 105 page 169). The bath should not get above 120° Faht. For 100 lbs. of woollen yarn take, (according to the quality of the wool) 2—3 or more lbs. peroxide of soda. An after-treatment with diluted acetic acid has proved very serviceable.

Bleaching Bath.

Dissolve first:

3 lbs. Epsom salt crystals and then
1 lb. peroxide of soda* in
9 1/2 galls. water,

and if necessary add 3 1/2 oz. sulphuric acid.

* Remarks: The peroxide of soda should always be dissolved in cold water, and should the solution warm up at all it must be cooled down. In order to avoid a violent reaction, similar to combustion with a fizzing and spurting noise, the peroxide of soda should not be dissolved all at once, but in small quantities under constant stirring.

Owing to the precipitation of magnesia hydrate a turbid milky liquid forms, which can be employed at once for goods that are not susceptible. On account of the percentage of magnesia hydrate the bath reacts rather alkaline, and it has been found advantageous to add about 1 1/4 lbs. concentrated sulphuric acid 166° Tw. to neutralise the magnesia hydrate as well as to decompose any magnesia peroxide which might have arisen and which would spoil the effect of the bleach. The milky turbidness almost entirely disappears and the bath thus prepared is very effective.

b) Preparing of the Yarn.

In order to obtain a fine full white, woollen yarn is chlorinated before printing; the white of unchlorinated woollen yarn remains, however, slightly cleaner, but the colour does not develope so well as on chlorinated woollen yarn.

For 25 lbs. of woollen yarn take per 30 gallons cold water 1 1/2 lbs. sulphuric acid 166° Tw., work the yarn in this for 1 hour, during which add in small portions 2 4/5 pints chloride of soda 1 1/2° Tw. Afterwards rinse well, and then run through a bath containing 1 1/5 pints sulphuric acid 166° Tw. per 30 gallons water, wash well, and dry at a moderate temperature.

The chloride of soda solution is prepared as follows:

Dissolve:

4 lbs. chloride of lime in
2 galls. 3 pints cold water; then dissolve
4 lbs. soda ash in
2 galls. 3 pints water.

The cold soda solution is added to the cold chloride of lime solution under constant stirring. Allow the solution to stand for 12 hours, and then pour off the clear solution of 15° Tw. and make up to 1½° Tw.

Preparing with tin is done in a similar manner to the method described under No. 105, page 170 for woollen pieces. Occasionally woollen yarn is also prepared with 10% alum.

The process of drying the yarn after preparing it is of considerable importance. The yarns must be dried slowly at the ordinary temperature, and best in closed rooms.

c) Yarn Printing.

The composition of thickenings has to be in accordance with the character of the colour, gum, potato or wheat flour, British gum, wheat starch, tragacanth, etc. being employed.

Acid colours are more generally used for woollen yarn printing than Mordant or Benzidine colours.

The yarn is, as a rule, steamed wet in special steam boxes as soon as it is printed, and in only exceptional cases is it dried beforehand.

The colours are developed and fixed in steam as wet as possible. According to the character of the colour more or less humidity is required.

General Recipe for Yarn Printing I
(for Donath's machine).

Dissolve:

3	oz.	or 30 grms.	**Acid Wool Colour**	in
1	pint	» 200 »	water,	and stir up with
3⅘	»	» 770 »	wheat flour thickening, if necessary warm again, then add 5 drops sulphuric acid 166° Tw. diluted 1 : 10	

1000 grms.

Wheat Four Thickening.

Stir up slowly to a paste:

9	oz.	or 91 grms.	wheat flour	in
4 3/10	pints	» 864 »	water, boil, and then add	
1 4/5	noggs.	» 45 »	10% solution of sulphate of aluminia	

1000 grms.

General Recipe for Woollen Yarn Printing II.
(for block printing on carpet yarn, system Hallensleben).

Dissolve:

$2\frac{7}{10}$ oz. or 27 grms. **Acid Wool Colour** in
$2\frac{1}{2}$ pints » 500 » water, and stir in
$22\frac{1}{2}$ galls. » 36 litres potato starch thickening, add
2 pints » 400 ccm. acetic acid 9° Tw. (30%)
$\frac{3}{4}$ » » 150 » sulphuric acid 166° Tw.

Potato Starch Thickening.

Boil:

$1\frac{1}{4}$ lbs. or 1250 grms. potato starch in
4 galls. » 40 litres water.

Steam the printed woollen yarn for 20—60 minutes without pressure, wash and dry.

125. **Wool colours,** which **dye** wool in a **slightly alkaline bath** and are afterwards **developed** on the fibre with **sulphuric acid;** these colours can also be **printed** on wool with acetic acid:

Blues: *Alkali Blue 1B—7B, 1R—6R extra

Directions for dyeing Alkali Blues.

Alkali Blues are dyed on wool in an alkaline bath. If dyed acid a greater part of the colour would precipitate in the bath, owing to the difficulty with which they dissolve, and the shade would be uneven, the colour only partly penetrated and the colour not fast to rubbing. Dye for $\frac{3}{4}$—1 hour at the boil with the addition of 3% borax or 2% soda ash or 5% silicate of soda or phosphate of soda respectively. The wool remains almost colourless, being of a pale greenish blue. Rinse well, and develope in a second bath with about 5% sulphuric acid.

When employing a cold acid bath the shade assumes a more greenish tone, whereas at a temperature of 120—140° Faht. it is redder. Finally rinse well. Shading can also be done in an acid bath with the addition of acid or Basic colour.

Directions for Printing.

Print Alkali Blues on chlorinated woollen cloth, steam for 1 hour without pressure, wash and dry.

* These dyestuffs when dyed on wool are fast to water by the side of white wool.

Printing Recipe.

Dissolve:

3 oz.	or	30 grms.	**Alkali Blue** in
1 ½ pints	»	300 »	water, thicken with
3 »	»	600 »	gum solution 1 : 1 and then add
1 ⅔ noggs.	»	70 »	acetic acid 9° Tw. (30%)
		1000 grms.	

126. **Acid** and **weakly acid dyeing wool colours,** which can **afterwards** be **chromed** without altering the shade, for which reason they are adapted for shading mordant colours:

Reds: Anthracene Red
Azo Fuchsine 6B
Azo Crimson S
*Azo Phloxine 2G
Bordeaux extra
*Rhodamine B, G

Yellows: Fast Light Yellow G, 3G
Quinoline Yellow (fairly good)
Tartrazine

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder
Alkali Fast Green B, G
*Brilliant Acid Green 6B
*Fast Green CR, W

Blues: Soluble Blues I green shade, I red shade, 3B extra green shade, TRG

Violets: Fast Acid Violet 10B
Acid Violet 4B extra, 3R

Blacks: Acid Chrome Black B, G

The shades of certain Acid colours when dyed on wool according to the recipe on page 167 under No. 105 are not changed at all or but slightly when after-treated with bichrome, but become slightly faster to washing, and can be employed for shading certain Mordant colours.

After the bath is exhausted add to the acid bath ½—1 ½ % bichrome or chromate of soda, boil for another ½ hour and then rinse. The quantity of

* Those colours marked with an asterisk are fast to milling.

bichrome or chromate of soda requisite should be determined by trial tests, as by employing an excess of bichrome or chromate of soda the colour is partly destroyed, and should not sufficient have been taken then the desired fastness is not obtained.

127. Wool colours **dyeing** on **chrome** or **alumina mordanted wool:**

Reds: Alizarine Purpurine paste (alumina)
Alizarine IIAB, WB, WR, WRB, BX and X in paste, W, W extra, WS, WSM, SB, WST, PS in powder (alumina)
Anthracene Red powder (Chrome)
Cloth Red B, 3 B extra, G, G extra, 3 G extra (Chrome)

Oranges: Alizarine Orange G, GG, RD, W in paste, R in powder and in paste (alumina)
Diamond Orange paste (Chrome)
Fast Printing Yellow R in paste and in powder (Chrome)

Yellows: Anthracene Yellow in paste and in powder (Chrome), G
Chrome Yellow in paste, D, G in powder R extra in powder and in paste (Chrome)
Diamond Flavine G in powder and in paste (Chrome)
Diamond Yellow G in paste (Chrome)
Fast Printing Yellow 3 G in powder (Chrome)

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder (Chrome)
Alizarine Green V in paste and in powder DG in paste (Chrome)
Alizarine Green in paste and in powder (Chrome)
Alizarine Green S and SW in paste (Chrome)
Alizarine Green B, SS in powder (Chrome)

Blues: Alizarine Blue GG, GW, R double, BM, WA in paste, S, S extra, SR, SR extra, SW in paste and in powder (Chrome)
Alizarine Blue 3 RX double, IIX, A, B, NHX, BR, GH, HJ, NSG extra, NSG, NS, NFA in paste and in powder, WRR extra, R extra, WK, WB, RG, G, SCH, NSV, in paste (Chrome)

Blues: Alizarine Blue JR in paste and in powder (Chrome)
Alizarine Blue SAP, SAE in powder and in paste, SAC powder (alumina) (Chrome)
Alizarine Blue SKY in paste and in powder (Chrome)
Alizarine Blue SKY powder (Chrome)
Alizarine Blue BAG, BAR in paste and in powder (Chrome)
Alizarine Blue BRG, BR3G in paste and in powder (Chrome)
Chrome Blue in paste (Chrome)
Celestine Blue B in powder (Chrome)
Gallamine Blue in paste (Chrome)

Violets: Alizarine BX in paste and in powder, BXP, BBP, GX, GP, GG, GGP in paste (Chrome)
Alizarine Blue HR in paste (Chrome)
Chrome Violet in paste (Chrome)
Gallo Cyanine in paste and in powder
Galleine in paste and in powder (Chrome)

Browns: Acid Anthracene Brown R, T, W in powder (Chrome)
Acid Chrome Brown T (chrome)
Alizarine BX in paste and in powder, BXP, BXG, GP, GG, GGP in paste (alumina)
Alizarine BRX in paste (alumina)
Alizarine Orange G, GG, RP and W in paste, R in powder and in paste (Chrome)
Alizarine Red (all brands, please refer to Red) (Chrome)
Alizarine Red Brown R in powder (Chrome)
Anthracene Brown G, R in powder and in paste, GG, K, RP, W paste (Chrome)
Diamond Brown in paste, BW in powder (Chrome)
Fast Brown in powder (Chrome)

Greys: Alizarine Black B and 3B in powder and in paste (Chrome)
Alizarine Black IA in paste and in powder (Chrome)

Greys: Alizarine Fast Black in paste and in powder (Chrome)

Blacks: Acid Chrome Black B, G (Chrome)
Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder (Chrome)
Diamond Black 2B, 4B, F, FB, FR, GA, NG, NR, PV, PVB, powder and paste ST (Chrome)

Directions for dyeing Mordant colours on wool mordanted with chrome or alumina.

A) Mordanting.

a) Chrome Mordant.

The mordanting of wool with chrome in order to obtain shades as fast as possible to milling, light and wear, dyed with Mordant colours, can be done either with the salts of chromic acid such as bichrome or chromate of soda or chromic acid itself or with chromic salts such as fluoride of chrome or chrome alum. By the reducing action of the wool chromium chromate is formed on the wool from the chromate salts.

As many Mordant colours are susceptible to chromic acid, it is advisable to add certain organic substances, such as tartar, lactic acid, oxalic acid, vegetaline (3—4%) lactoline (4%), lignorosine (2.7—4½%) etc. to the bichrome or chromate of soda which convert the chromic acid to chrome oxide.

In addition to this the Mordant dyestuffs form chrome lakes best with chrome oxide; the wool also not being so much affected when the reducing of the chromic acid is done with tartar, etc.

For this reason therefore mordant with bichrome or chromate of soda in conjunction with the above mentioned organic substances. Chrome oxide can also be produced on the fibre by bichrome (chromate of soda) or chromic acid and bisulphite.

The volume of the mordant liquors is, according to the nature of the material, 30—50 : 1 of goods. The liquors can be employed for several batches, and

the additions of bichrome and tartar can be reduced $^1/_3$rd, but as the liquors get so dirty in time it is best not to employ them too often.

The bichrome and tartar Mordant

is the one most generally employed, as with it very fine level shades are obtained. According to the respective shade, employ for light, dark or very dark shades:

1—3—4 % bichrome or chromate of soda and
1—2 $^1/_2$—3—4 % tartar (when employing hard water, add about 5—10 % acetic acid 9° Tw. (30 %) to soften it.).

Enter the wool into the mordant liquor at 120—140° Faht., bring to the boil, boil for 1—1 $^1/_2$ hours and wash well. The best results as regards level shades in dyeing, are obtained by adding the tartar after the wool has been boiled a fairly long time with bichrome or chromate of soda. At all events the bichrome and tartar are to be added to the bath separately.

Bichrome · Lactic Acid · Acetic Acid · Mordant.

1 $^1/_2$—3 % bichrome or chromate of soda
3—5 % lactic acid (50 %)
3 % acetic acid 9° Tw. (30 %)

Bichrome · Lactic Acid · Sulphuric Acid · Mordant.

1 $^1/_2$—3 % bichrome or chromate of soda
3—5 % lactic acid (50 %)
1—1 $^1/_2$ % sulphuric acid 166° Tw.

Add these mordants one after another at 160° Faht. under constant stirring, enter the wool, work for $^1/_2$ hour at this temperature, bring to the boil for $^1/_2$ hour and continue boiling for 1 hour. The bath is thoroughly exhausted.

Bichrome · Oxalic Acid · Mordant.

2—4 % bichrome or chromate of soda
2—3 % oxalic acid.

Treat in the same manner as stated above.

An addition of $^1/_2$—1 % sulphuric acid causes the bichrome to exhaust better. This mordant is cheaper than the bichrome and tartar mordant, and the shades are generally brighter, and blue colours have a greener one than those obtained on a tartar mordant.

Chromic Acid Mordant.

According to Amend wool is sometimes mordanted in the United States as follows: mordant first for 10 mins. with 1% chromic acid in a bath containing a volume of water of 50 : 1 of goods, then add 3% sulphuric acd 166° Tw., work for ½ hour cold, add 8—10% bisulphate of soda 52° Tw., and work also cold for about another ¾ hour. Run off the liquor, and after-treat in a fresh bath containing 5% soda ash. Warm up the bath to 130° Faht. and treat the chromed wool in it for ½—¾ hour, then rinse well.

Fluoride of chrome and oxalic acid Mordant.

2—4% Fluoride of chrome
2—4% oxalic acid.

Enter the wool at 120—140° Faht., boil for 1½ hours and wash well. When mordanting with fluoride of chrome it is best to work in wooden and not in copper vessels, owing to the presence of fluoric acid.

b) Alumina Mordant.

Mordant the wool for 1½ hours at 200° Faht. with
6—8—10% sulphate of alumina free from iron or alum free from iron and
3—4—5% tartar (tartar can sometimes partly be substituted with
2% oxalic acid)

The volume of water in the mordant bath should be about 30—50 : 1 of the weight of the goods.

B) Dyeing.

a) On a chrome Mordant.

The previously chromed woollen yarns or pieces are dyed best immediately they are washed. If this cannot be done, then hydro-extract to prevent unevenness. Chromed wool has also to be protected from the influence of light. By hanging the woollen yarns or pieces up to dry, whereby they become dry in parts, flecky spots ensue when subsequently dyed. Dye with the addition of about 2% acetic acid and the corresonding quantity of Mordant colour. The quantity of acetic acid necessary depends upon the hardness of the water. The volume of dye liquor should be about 30—50 : 1 of goods. Stir up the Mordant colour in water, and add the solution to the bath through a fine

hair sieve. Enter the goods at 85-105° Faht., bring slowly to the boil and boil for 1½—2 hours, then rinse well.

It is absolutely necessary to boil many kinds of chrome lakes, such as Alizarine Cyanines, for a longer time, in order that the colour developes properly. When dyeing goods that have to be penetrated very well or goods that have been milled severely employ acetate of ammonia or borax. Acetate of ammonia need not be used for loose wool, but the acetic acid should then be added to the bath at the commencement.

When dyeing with the addition of

3—5 % acetate of ammonia

enter the goods at 100—120° Faht., and bring to 195° Faht. within 1 hour; add carefully at a temperature between 195 and 212° Faht. 1—4 % diluted acetic acid (calculated according to the hardness of the water and quantity of colour used), and then boil for 1½ hours. As copper has an effect on many colours, add about 1 oz. sulphocyanide of ammonia per 32 gallons of liquor when working in copper vessels.

b) On an Alumina Mordant.

Alizarine Reds are dyed best with 2½—5 % acetate of lime and ½—2 % tannic acid together with some soap if necessary. Enter the goods at the ordinary temperature, bring slowly to the boil within ¾ hour and boil for 1—1½ hours. It is seldom necessary to add acetic acid, except when dyeing Alizarine Red W.

c) Mordanting and Dyeing in one bath.

Some colours, especially when dyed in light shades, can be dyed in one bath by adding the colour to the mordant bath. Dye for 1 hour at the boil with the addition of:

2—4 % chrome alum

or 1—2 % fluoride of chrome (or acetate of chrome) to the requisite quantity of Mordant colour and

2—3 % acetic or oxalic acid.

Alum is also sometimes employed for the above recipe.

128. **Mordant colours** which dye well **in one bath in combination with bichromate of potash,** (all the colours in brachets produce almost good results):

Reds: Anthracene Red
Cloth Red G, G extra, B, 3 B extra, 3 G extra
Yellows: Chrome Yellow R extra in powder and in paste
Diamond Flavine G in paste and in powder
Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder
(Alizarine Green SS)
Blues: Alizarine Blue GG, GW, and R double paste
Alizarine Blue SKY paste and powder
Browns: (Acid Anthracene Brown W, T)
Blacks: Alizarine Black B, 3 B in paste and in powder
(Alizarine Fast Black in paste and powder)

Dye for ½ hour, bringing the bath up to the boil, with the addition of

10—20 % Glauber's salt crystals and
1—1¼ % bichrome, without any acid,

boil for ½ hour, then add 1—2 % acetic acid, boil for another ½ hour and rinse.

129. **Mordant colours dyeing wool acid** in a bath containing acetic acid and Glauber's salt, and which can **afterwards be treated** with ½—3 % **bichrome:**

Reds: Anthracene Red
Cloth Red B, 3 B extra, G, G extra and in particular 3 G extra
Yellows: Fast Printing Yellow 3 G powder
Anthracene Yellow C
Chrome Yellow R extra in paste and in powder, D, G in powder
Diamond Flavine G in paste and in powder
Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder
Alizarine Green V in powder and in paste, DG in paste
Alizarine Green B, SS
Blues: Alizarine Blue HJ, NSG, NSG extra, NS, A, IIX in powder and in paste

Blues: Alizarine Blue JR in paste and in powder
Alizarine Blue SAP, SAE in paste and in powder, SAC in powder
Alizarine Blue SKY powder and paste
Alizarine Blue BR 3 G in paste and in powder

Browns: Acid Anthracene Brown R, T, W in powder
Acid Chrome Brown T
Alizarine Orange G, GG, RP, W in paste, R in powder and in paste
Alizarine Red W, W extra, WS, WSM, SB, WST, PS* in powder, WB, WR, WRB in paste
Diamond Brown BW in powder

Greys: Alizarine Black B and 3 B in powder and in paste
Alizarine Black IA in powder and in paste
Alizarine Fast Black in powder and in paste

Blacks: Acid Chrome Black B, G
Alizarine Black IA in powder and in paste
Alizarine Black B and 3 B in powder and in paste
Alizarine Fast Black in powder and in paste
Diamond Black 2B, 4B, F, FB, FR, GA, NG, NR, PV, ST

Prepare the dye bath with the requisite quantity of Mordant colour, previously well dissolved in water and added to the bath through a fine hair sieve, add 2—3 % acetic acid and 20 % Glauber's salt crystals, dye for ½ hour bringing the bath up to the boil, and continue boiling for 1 hour. If the bath is not exhausted add another 1 % acetic or sulphuric acid and boil until the liquor is clear. Allow to cool down to 165° Faht. add ½—1½ % bichrome or chromate of soda, dissolved in water, boil for another ½ hour, rinse well and dry.

Remarks: The following recipe is especially to be recommended for the dyeing of Diamond Blacks: Add the colour and acetic acid (or sulphuric acid) to the dye bath about half full of water, boil up, then cool

* Not more than 1 % bichrome should be used in the after-treatment.

down with water to 120—140° Faht., enter the goods, bring to the boil within ½ hour and boil for ½—¾ hour until the liquor is clear, adding if necessary 1 % sulphuric acid. Afterwards add 1½ % bichrome or chromate of soda dissolved in water, and boil for ½ hour, then rinse well and dry. When dyeing loose wool (especially mixed qualities) it is best to enter at the boil, in order to avoid light ends.

130. **Mordant colours,** which when **dyed on wool** are rendered **faster to milling** by an **after treatment** with **fluoride of chrome:**

Reds: Anthracene Red in powder
Cloth Red B, 3 B extra powder
Yellows: Chrome Yellow D, G in powder, R extra in powder and in paste
Diamond Flavine G in paste and in powder
Greens: Alizarine Green CG extra and CE in paste and in powder, CK in powder
Blues: Alizarine Blue WRS and 3 RS in powder
Alizarine Blue SKY
Alizarine Blue BAG and BAR in paste and in powder
Alizarine Blue BRG and BR 3 G in powder and in paste
Browns: Alizarine Orange G, GG, RP and W in paste, R in powder and in paste
Alizarine Red W, W extra, WS, WSM, SB, WST, PS in powder
Greys: Alizarine Black B and 3 B in paste and in powder
Blacks: Diamond Black F

The method for dyeing the above colours is the same as that given on page 211 under No. 128, with the exception, that 1—4 % fluoride of chrome is used instead of bichrome for after-treating. After adding the dissolved fluoride of chrome, boil for ½ hour, rinse well and dry.

131. **Mordant colours,** which can be employed for **dyeing slubbing** in machines on a **chrome mordant** (or which can be **afterwards chromed):**

Reds: Anthracene Red in powder
Cloth Red 3 G extra, G extra
Yellows: Anthracene Yellow in powder and in paste

Yellows: Chrome Yellow in paste
Chrome Yellow D, G in powder, R extra in powder and in paste
Diamond Flavine G in paste and in powder
Diamond Yellow G in paste
Fast Printing Yellow 3G in powder

Greens: Alizarine Green CG extra, CE in paste and in powder, CK in powder
Alizarine Green in powder and in paste, S and SW in paste
Alizarine Green B, SS

Blues: Alizarine Blue 3RX, IIX, A, B, NHN, BR, EII, GII, HJ, NSG extra, NSG, NS, NFA in paste and in powder, NFA extra, WB, WB extra, 3RS, WRS in powder, WRR extra, R extra, WK, RG, SCH, NSV in paste
Alizarine Blue SAP, SAC, SAE in powder and in paste
Alizarine Blue SKY paste and powder
Alizarine Blue BAG and BAR in paste
Alizarine Blue BRG and BR3G in powder and in paste

Browns: Acid Anthracene Brown R, T, W
Alizarine Red PS, W, W extra, WS, WSM, SB, WST in powder, WB, WR, WRB in paste
Alizarine Orange G, GG, RP and W in paste, R in powder and in paste
Anthracene Brown G, R in paste and in powder, GG, W in paste (for light shades)

Greys: Alizarine Black B and 3B in paste and in powder

Blacks: Acid Chrome Black B, G
Alizarine Black B and 3B in paste and in powder
Alizarine Black IA in paste and in powder
Alizarine Fast Black in paste and in powder, BG and SP in paste
Diamond Black F, FR, GA, NG, NR, FB, PV, PVB

As regards cleaning of the slubbing we refer you to remarks on page 192—194 under Nos. 121 and 122.

If necessary the slubbing is wet out for ¼ hour with 2% ammonia before dyeing, and then rinsed cold for ¼ hour.

The recipe for mordanting and dyeing with mordant colours on a chrome mordant is given on pages 207—210 under No. 127.

The recipe for dyeing Mordant colours in an acid bath and after-treated with bichrome will be found on page 212, under No. 129, and the after-treatment with fluoride of chrome on page 213, under No. 130.

Remarks: To avoid frothing when dyeing Diamond Blacks in machine, dissolve the colour with the quantity of acetic acid necessary for dyeing.

132. **Mordant colours**, which are adapted for **slubbing printing:**

Reds: Alizarine Purpurine in paste (alumina)
Alizarine Red WB and RX in paste, W and W extra in powder (alumina)
Anthracene Red in powder and in paste (Chrome)
Cloth Red B (Chrome)

Oranges: Alizarine Orange G, GG, R, RD in paste (alumina)

Yellows: Anthracene Yellow in paste (Chrome)
Chrome Yellow D, G in powder, R extra paste (Chrome)
Diamond Flavine G in powder and in paste (Chrome)
Fast Printing Yellow 3 G in powder (Chrome)

Greens: Alizarine Green CG extra and CE in paste and in powder, CK in powder (Chrome)
Alizarine Green V in paste and in powder, DG in paste (Chrome)
Alizarine Green S and SW in paste (Chrome)

Blues: Alizarine Blue GG, GW and R double in paste, S, S extra, SR, SR extra and SW in paste and in powder (Chrome)
Alizarine Blue 3 RX, HX, A, B, R extra, NHN, BR, GII, HJ, NSG extra, NSG, NS, NFA in paste and in powder, WRR extra, WK, WB, RG, G, SCH, NSV in paste (Chrome)

Blues: Alizarine Blue JR in paste and in powder (Chrome)
Alizarine Blue SKY in paste (Chrome)
Alizarine Blue SAP, SAE in powder and in paste, SAC in powder (Chrome) (alumina)
Alizarine Blue BAG and BAR in paste and in powder (Chrome)
Alizarine Blue BRG, BR3G in paste and in powder (Chrome)
Celestine Blue B (Chrome)
Chrome Blue in paste (Chrome)

Violets: Chrome Violet in paste (fluoride of chrome)
Galleine in paste (Chrome)

Browns: Alizarine Orange G, GG, RD, W in paste, R in powder and in paste (Chrome)
Alizarine Red WB, WR in paste, W and W extra in powder (Chrome)
Anthracene Brown G, R in paste and in powder GG, W in paste (Chrome)

Greys: Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder BG in paste (Chrome)

Blacks: Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder, BG, SP in paste (Chrome)

Recipe for Slubbing Printing.

We refer you to the general remarks on slubbing printing with Acid colours given under No. 122 on pages 193—195.

The print pastes are prepared as follows: boil up the thickening agents (British gum, tragacanth or dextrine) together with the Mordant dyestuff and water, pour this into a wooden bucket or tub, add the oxalic acid, and when cooled down add the acetate of chrome or fluoride of chrome dissolved in water, or another method is to prepare a quantity of standard thickening

and when cooled down, the requisite amount is taken to which the Mordant dyestuff dissolved in water or stirred up in paste is added, and afterwards the dissolved mordants are added.

Slubbing printed with mordant colours should be even more carefully steamed than slubbing printed with Acid dyestuffs, as the chrome or alumina lakes do not form so easily. Steam the slubbing as soon as it is printed, without previously drying, for 1—1½ hour with 7½ lbs. pressure. The colour is fixed better if the slubbing is allowed to lie for several hours before washing same.

Printing Recipes.

Steam Red.

Boil:

3 oz.	or	30 grms.		**Alizarine Red W powder**
1¼ pints	»	250	»	British gum and
2 »	»	410	»	water, add
½ »	»	100	»	acetic acid 9° Tw. (30%)
⅖ nogg.	»	20	»	oxalic acid, and when cold add
4 oz.	»	40	»	sulphate of alumina dissolved in
¾ pint	»	150	»	water
		1000 grms.		

Steam Black.

Boil:

30 oz.	or	300 grms.		**Alizarine Fast Grey BG paste**
20 »	»	200	»	British gum and
2 pints	»	400	»	water, add
⅖ nogg.	»	20	»	oxalic acid; when cold add
1⅗ noggs.	»	80	»	acetate of chrome 32° Tw.
		1000 grms.		

Steam Blue.

Boil:

30 oz.	or	300 grms.		**Alizarine Blue A paste**
25 »	»	250	»	British gum and
4⅗ noggs.	»	230	»	water, add
⅖ nogg.	»	20	»	oxalic acid; when cold add
4 oz.	»	40	»	fluoride of chrome dissolved in
3⅕ noggs.	»	160	»	water
		1000 grms.		

Steam for 1 hour with 7 1/2 lbs. pressure, wash, soap, wash again and dry.

133. **Mordant colours**, which when either **dyed** or printed on **wool** are remarkable for their **good fastness to light:**

Reds: Alizarine Purpurine in paste (alumina)
Alizarine Red W, W extra, WS, WSM, SB, WST, PS in powder, WB, WRB, WR in paste (alumina)
Cloth Red B, G, G extra (Chrome)

Oranges: Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (alumina)

Yellows: Anthracene Yellow in paste and in powder (Chrome)
Chrome Yellow D in powder, R extra in powder and in paste (Chrome)
Diamond Flavine G in paste and in powder (Chrome)
Fast Printing Yellow 3 G in powder (Chrome)

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder (Chrome)
Alizarine Green V in powder and in paste, DG in paste (Chrome)
Alizarine Green in paste and in powder, S and SW in paste (Chrome)
Alizarine Green B (Chrome)

Blues: Alizarine Blue S, S extra, SR, SR extra and SW in powder and in paste, GG, GW and R double, BM and WA in paste (Chrome)
Alizarine Blue 3 RX, IIX, WRR extra, A, B, R extra, NHN, BR, GII, NSG, NSG extra, NS, NFA in paste and in powder, WB, WK, RG, G, SCH, NSV in paste, 3 RS, WRS (Chrome)
Alizarine Blue JR in paste and in powder (Chrome)
Alizarine Blue SAP, SAE in powder and in paste, SAC in powder (Chrome)
Alizarine Blue SKY powder and in paste (Chrome)

Blues: Alizarine Blue BAG and BAR in paste and in powder (Chrome)
Alizarine Blue BRG, BR3G in powder and in paste (Chrome)

Violets: Alizarine BXP, BBXP in paste, BX in paste and in powder (Chrome)

Browns: Acid Anthracene Brown R, T, W (Chrome)
Acid Chrome Brown T (Chrome)
Alizarine Red W, W extra, WS, WSM, SB, PS, WST in powder (Chrome)
Alizarine GX, GGX, GXP, GGXP in paste (alumina)
Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (Chrome)
Anthracene Brown G, R in paste and in powder, GG, W in paste (Chrome)

Greys: Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)

Blacks: Acid Chrome Black B and G (Chrome)
Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder, BG and SP paste (Chrome)
Diamond Black 2B, F, FB, FR, GA, NG, NR, PV (Chrome)

134. **Mordant colours,** which when either **dyed** or **printed** on wool are **fast to alkali** (resisting **20% ammonia:**

Reds: Alizarine Purpurine in paste (alumina)
Alizarine Red W, W extra, WS, WSM, SB, WST, PS in powder, WB, WR, WRB in paste (alumina)
Anthracene Red (Chrome)
Cloth Red 3B extra, G extra, 3G extra (Chrome)

Oranges: Alizarine Orange G, GG, RP, W in paste, R in powder and in paste (alumina)

Oranges: Diamond Orange in paste (Chrome) (fairly good)
Fast Printing Yellow R paste and powder (Chrome)

Yellows: Anthracene Yellow in paste and in powder (Chrome), C
Chrome Yellow R extra in paste and in powder, D in powder (Chrome)
Diamond Yellow G in paste (Chrome)
Fast Printing Yellow 3 G in powder (Chrome)

Greens: Alizarine Green in paste and in powder, S and SW in paste (Chrome)
Alizarine Green B, SS (Chrome)

Blues: Alizarine Blue GG, GW, R double, BM paste, S, S extra, SR, SR extra, SW in paste and in powder (Chrome)
Alizarine Blue 3RX, IIX, A, B, NHN, BR, GII, EII, HJ, NSG extra, NS, NEA, in paste and in powder, WRR extra, R extra, WK, WB, RG, SCH, NSG, NSV in paste (chrome)
Alizarine Blue JR in paste (Chrome)
Alizarine Blue SKY in powder and in paste (chrome)
Alizarine Blue BAG and BAR in paste and in powder (Chrome)
Alizarine Blue BRG and BR3G in paste and in powder (Chrome)
Celestine Blue B (Chrome) (fairly good)
Chrome Blue paste (Chrome)
Gallamine Blue in paste (Chrome)

Violets: Alizarine GX, GGX in paste (Chrome)
Chrome Violet paste (Chrome)
Galleine in paste and in powder (Chrome)
Gallo Cyanine in paste and powder (Chrome)

Browns: Acid Anthracene Brown R, T, W (Chrome)
Acid Chrome Brown T (Chrome)
Alizarine BX in paste and in powder (alumina)
Alizarine Orange G, GG, W in paste, R in paste and in powder (Chrome)
Alizarine Red Brown R (Chrome)

Browns: Alizarine Red W, W extra, WS, WSM, SB, WST, PS in powder, WB, WRB, WR in paste (Chrome)
Anthracene Brown G, R in paste and in powder, GG, W in paste (Chrome)
Diamond Brown BW in powder (Chrome)
Fast Brown in powder (Chrome)

Blacks: Acid Chrome Black B, G (Chrome)
Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder, BG and SP paste (Chrome)
Diamond Black F, ST, PV, FB, PVB (Chrome)

135. **Mordant colours,** which when **dyed** on **chrome mordanted** wool are **fast to acid** (resisting **hydrochloric acid** 4° Tw.):

Yellows: Anthracene Yellow in paste and in powder (Chrome) (almost good)

Greens: Alizarine Green CF, CG extra in paste and in powder, CK in powder (Chrome)
Alizarine Green B (Chrome)

Blues: Alizarine Blue GG, GW and R double, BM in paste, S, S extra, SW, SR, SR extra in paste and in powder (Chrome)

Browns: Acid Chrome Brown T (Chrome)
Alizarine Red Brown R (Chrome)
Diamond Brown in paste (Chrome)
Fast Brown in powder (Chrome)

Blacks: Acid Chrome Black B, G (Chrome)
Alizarine Black B and 3B in paste and in powder (Chrome) (almost good)
Alizarine Black IA in paste and in powder (Chrome) (almost good)
Alizarine Fast Black in paste and in powder (Chrome)
Diamond Black F, FB, PV (Chrome)

136. **Mordant colours** which when **dyed** on wool are fast to **stoving:**

Reds: Alizarine Red W, W extra, SB, WS, WSM (alumina)
Anthracene Red (Chrome)

Reds: Cloth Red B (slightly bluer), 3B extra, G, 3G extra (Chrome)

Oranges: Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (alumina)

Yellows: Anthracene Yellow C (Chrome)
Diamond Flavine G in powder and in paste (Chrome)
Diamond Yellow G in paste (Chrome)
Fast Printing Yellow 3 G in powder (Chrome)

Greens: Alizarine Green CE and CG extra in powder and in paste, CK in powder (Chrome)
Alizarine Green B, SS (Chrome)

Blues: Alizarine Blue GG, GW and R double, BM and WA in paste, S, S extra, SR, SR extra and SW in paste and in powder (Chrome)
Alizarine Blue 3RX, IIX, A, B, NHN, BR, GII, HJ, NSG extra, NSG, NS, NFA in paste and in powder, WRR extra, R extra, WK, WB, RG, G, SCH, NSV in paste (Chrome)
Alizarine Blue JR in paste and in powder (Chrome)
Alizarine Blue SKY in paste and in powder (Chrome)
Alizarine Blue SAP, SAE in paste and in powder, SAC in powder (Chrome)
Alizarine Blue BAG, and BAR in paste and in powder (Chrome)
Alizarine Blue BRG and BR3G in paste and in powder (Chrome)
Chrome Blue in paste (Chrome)
Celestine Blue B (Chrome) (almost good) (slightly greyer)

Violets: Alizarine Blue HR in paste (Chrome)
Alizarine BX in paste and in powder (Chrome)
Gallo Cyanine in paste and in powder (Chrome)

Browns: Acid Anthracene Brown R, T, W in powder (Chrome)
Alizarine BXP, BBXP, GXP, GGXP, GGX, GX in paste (alumina), (almost good)

Browns: Alizarine Orange G, GG, RP and W in paste, R in paste and in powder (Chrome)
Alizarine Red W, W extra, WS, WSM (Chrome) (almost good)
Anthracene Brown G, R in paste and in powder GG, W in paste (Chrome) (almost good)

Blacks: Acid Chrome Black B, G, (Chrome)
Alizarine Black B and 3B in paste and in powder (Chrome) (slightly)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder, BG paste (Chrome)
Diamond Black 2B, F, FB, FR, GA, NG, NR, PV, ST (Chrome)

137. **Mordant colours,** which when **dyed** or **printed** on wool are **fast to rubbing:**

Reds: Alizarine Red W and W extra, WS, WSM, WST, PS, SB in powder (alumina)

Oranges: Fast Printing Yellow R in paste and in powder (Chrome) (fairly good)

Yellows: Anthracene Yellow in paste and in powder (Chrome)
Chrome Yellow D in powder (Chrome)
Diamond Yellow G in paste (Chrome)
Fast Printing Yellow 3G in powder (Chrome)

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder (Chrome)

Blues: Alizarine Cyanine in paste and in powder (Chrome)
Alizarine Blue SAP, SAE in powder and in paste, SAC in powder (Chrome)
Alizarine Blue SKY in paste and in powder (Chrome)

Violets: Alizarine GX, GGX in paste (Chrome)

Browns: Acid Anthracene Brown R, T, W in powder (Chrome)
Alizarine Red W, W extra, WS, WSM, WST, PS, SB in powder (Chrome)
Alizarine Red Brown R (Chrome)

Browns: Anthracene Brown G, R, in paste and in powder G G, W in paste (Chrome)
Fast Brown in powder (Chrome)
Greys: Alizarine Black B and 3 B in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder, B G and S P paste (Chrome)
Blacks: Alizarine Fast Black in paste and in powder, B G and S P paste (Chrome)
Diamond Black P V, P V B paste (Chrome)

138. **Mordant colours,** which when **dyed** on wool are **fast to water** by the side of **white wool:**

Reds: Alizarine Red W, W extra, W S, W S M, W S T, P S, S B (alumina)
Anthracene Red (Chrome)
Cloth Red 3 B extra (Chrome)
Yellows: Anthracene Yellow in paste and in powder (Chrome)
Chrome Yellow R extra in powder and in paste (Chrome)
Greens: Alizarine Green in paste and in powder, S and S W in paste (Chrome)
Alizarine Green B (Chrome)
Blues: Alizarine Blue S, S extra, S R, S R extra S W in paste and in powder, G G, G W and R double B M in paste (Chrome)
Alizarine Blue B A G and B A R in paste and in powder (Chrome)
Alizarine Blue G II, B, 3 R X, II X in paste and in powder, R extra, W K in paste (Chrome)
Celestine Blue B (Chrome)
Gallamine Blue in paste (Chrome)
Violets: Gallo Cyanine in paste and in powder (Chrome)
Browns: Alizarine Red W and W extra, W S, W S M, S B in powder (Chrome)
Anthracene Brown G, R in paste and in powder, G G and W in paste (Chrome)
Diamond Brown paste (Chrome)
Greys: Alizarine Black B, 3 B paste and in powder (Chrome)

Blacks: Alizarine Black B, 3B paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder (Chrome)
Diamond Black 2B, F, FR, GA, NG, NR, PV, ST (Chrome)

189. **Mordant colours,** which when **dyed** or **printed** on wool are **fast to milling** by the side of **white wool:**

Reds: Alizarine Purpurine in paste (alumina) (fairly good)
Alizarine Red W, W extra, PS, WST, WS, WSM, SB in powder, WB, WRB, WR, X in paste (alumina) (fairly good)
Anthracene Red (Chrome) (fairly good)
Cloth Red 3B extra, 3G extra (Chrome) (fairly good)

Oranges: Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (alumina) (fairly good)

Yellows: Anthracene Yellow in paste and in powder (Chrome)
Chrome Yellow in paste, D in powder (almos good), R extra (good) in powder and in paste (Chrome)
Diamond Flavine G in paste and in powder (Chrome) fairly good)
Diamond Yellow G in paste (Chrome)
Fast Printing Yellow 3G (Chrome) (fairly good)

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder (fairly good) (Chrome)
Alizarine Green V paste and powder (Chrome) (good)
Alizarine Green in paste and in powder, S and SW in paste (Chrome)
Alizarine Green B, SS (Chrome)

Blues: Alizarine Blue GG, GW and R double, BM and WA in paste, S, S extra, SR, SR extra and SW in paste and in powder (Chrome)

Blues: Alizarine Blue HJ, IIX (good), W, RB, A, NFA, NS, NSG, NSG extra in paste and in powder, NSV, SCH in paste (fairly good) (Chrome)
Alizarine Blue JR in paste and in powder (Chrome)
Alizarine Blue BAG and BAR in paste, and in powder (Chrome)
Celestine Blue B in powder (Chrome)
Chrome Blue in paste (Chrome)
Gallamine Blue in paste (Chrome)

Violets: Chrome Violet in paste (Chrome)
Galleine in paste and in powder (Chrome)
Gallo Cyanine in paste and in powder (Chrome)

Browns: Acid Chrome Brown T
Acid Anthracene Brown R, T, W (Chrome)
Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (Chrome)
Alizarine Red Brown R (Chrome)
Alizarine Red W, W extra, WS, WSM, SB, PS in powder, WB, WRB, WR (fairly good), X in paste (good) (Chrome)
Anthracene Brown G, R in paste and in powder, GG, W in paste (Chrome)
Diamond Brown in paste (Chrome)

Greys: Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)

Blacks: Acid Chrome Black B, G (Chrome)
Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder (Chrome)
Diamond Black 2B, 4B, F, FB, FR, GA, NG, NR, PV, ST (Chrome)

140. **Mordant colours,** which when **dyed** or **printed** on wool are **fast to milling** by the side of **white cotton:**

Reds: *Alizarine Orange R (zinc sulphate)
*Alizarine Red PS, W (zinc sulphate) (fairly good)

Yellows: Anthracene Yellow in paste and in powder (Chrome)
Chrome Yellow R extra (Chrome) (almost good)

Greens: Alizarine Green CE
Alizarine Green V in paste and in powder (Chrome) (good)
Alizarine Green in paste and in powder, S and SW in paste (Chrome)
Alizarine Green B (Chrome) (very good)

Blues: Alizarine Blue GG, GW, BM, WA paste, S, S extra, SR, SR extra and SW in powder and in paste (Chrome)
Alizarine Blue IIX paste and powder (Chrome) (rather good)
Alizarine Blue BAG, BAR in paste and in powder (Chrome)
Chrome Blue in paste (Chrome)
Celestine Blue B (Chrome)
Gallamine Blue in paste (Chrome)

Violets: Chrome Violet in paste and in powder (Chrome)
Galleine in paste and in powder (Chrome)
Gallo Cyanine (Chrome) (very good)

Browns: Acid Anthracene Brown R, T, W (Chrome)
Alizarine Orange G, GG, W in paste, R in paste and in powder (Chrome)
Alizarine Red WSM, WS, W, W extra (Chrome)
Anthracene Brown G, R in paste and in powder, GG, W in paste (Chrome) (almost good)
Diamond Brown paste (Chrome) (fairly good)

Greys: Alizarine Black B and 3B in paste and in powder (Chrome)

* Do not bleed on to mercerised cotton.

Greys: Alizarine Black IA in paste and in powder (Chrome)

Blacks: Acid Chrome Black B, G (Chrome) (fairly good)
Alizarine Black IA in paste and in powder (Chrome)
Diamond Black PV in powder and in paste (chrome)

141. **Mordant colours,** which are **fast to steaming:**

Yellows: Anthracene Yellow in paste and in powder C (Chrome)
Chrome Yellow in paste, D in powder, R extra in paste and in powder (Chrome)
Diamond Flavine G in paste and in powder (Chrome)
Fast Printing Yellow 3 G in powder (Chrome)

Greens: Alizarine Green CE and CG extra in paste and in powder (Chrome)
Alizarine Green in paste and in powder, S and SW in paste (Chrome)

Blues Alizarine Blue GG, GW and R double, BM in paste, S, S extra, SR, SR extra and SW in powder and in paste (Chrome)
Alizarine Blue BAG and BAR in paste and in powder (Chrome)
Alizarine Blue BRG and BR 3 G in paste and in powder (acid)
Alizarine Cyanine in paste and in powder (Chrome)

Violets: Alizarine BX in paste and in powder (Chrome)
Galleine in paste and in powder (Chrome)

Browns: Acid Anthracene Brown T, R, W (Chrome)
Acid Chrome Brown T (Chrome)
Anthracene Brown GG, W in paste, G, R in paste and in powder (Chrome)
Alizarine GX, GGX in paste (alumina)
Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (Chrome)
Alizarine Red WB, WRB, WR in paste, W, W extra, WST, WS, WSM, SB in powder (Chrome)

Greys: Alizarine Black B and 3 B in paste and in powder (Chrome)
Alizarine Black I A in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder, B G in paste (Chrome)
Blacks: Acid Chrome Black B, G (Chrome)
Alizarine Black B and 3 B in paste and in powder (Chrome)
Alizarine Black I A in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder B G, SP paste (Chrome)
Diamond Black PV (Chrome)

The recipe for steaming is the same as given on page 182 under No. 115 for Acid Wool colours.

142. **Mordant colours,** which when **dyed** on wool are **fast to carbonisation** (with sulphuric acid):

Reds: Anthracene Red (Chrome)
Cloth Red B, 3 B extra, G, G extra, 3 G extra (Chrome)
Yellows: Chrome Yellow R extra (Chrome)
Anthracene Yellow C (Chrome)
Blues: Alizarine Blue G G, G W and R double, B M, W A in paste, S, S extra, S R, S R extra, and S W in paste and in powder (Chrome)
Alizarine Blue B A G and B A R in paste and in powder
Gallamine Blue in paste (Chrome)
Brown: Acid Anthracene Brown R, T, W (Chrome)
Blacks: Alizarine Black B and 3 B in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder (Chrome)
Diamond Black F, F B, F R, G A, N G, N R, P V, S T, P V B powder and paste (Chrome)

The recipe for carbonising is the same as stated on pages 180—181 under No. 114 for Acid Wool colours.

143. **Mordant colours,** which are adapted for the **dyeing of gentlemen's woollen hat bodies** as well as **fur hats** on a bichrome and tartar mordant. (If necessary dyed in one bath and afterwards treated with chrome):

Yellows: Fast Printing Yellow 3 G in powder
Diamond Flavine G in paste and in powder
Greens: Alizarine Green CE and CG extra in paste and in powder
Alizarine Green in powder and in paste, S and SW in paste
Alizarine Green B
Blues: Alizarine Blue GG, GW and R double, BM in paste
Alizarine Blue IIX, A, GII, HJ in paste and in powder and other qualities
Alizarine Blue BRG and BR3G in paste and in powder
Violets: Galleine in paste and in powder
Browns: Acid Anthracene Brown R, W, T
Alizarine Orange G, GG, RP, W in paste, R in powder and in paste
Alizarine Red W, W extra, PS in powder
Anthracene Brown G, R in paste and in powder, GG, W in paste
Greys: Alizarine Black B and 3 B in paste and in powder
Blacks: Alizarine Black B and 3 B in paste and in powder
Alizarine Fast Black in paste and in powder
Diamond Black F, NG, 4 B

Boil up the fur hats first in water (if necessary with the addition of 20—30% Glauber's salt) for 20 mins., then rinse and hydro-extract; gentlemen's hat bodies are merely wet out. Alkaline planked hats must be washed in warm water to remove all soap from them; acid planked hats are first wet out in hot water, and then acidulated with ammonia.

Employ only colours that dye easily level and penetrate well, as well as being fast to light, steaming and hot pressing.

Mordant colours can either be dyed on a chrome mordant, or dyed first in an acid bath and subseqently after-chromed.

A) Chrome Mordant.

a) Mordanting.

Mordant light shades with
2 % bichrome and
1 3/4 % tartar
and dark shades with
3 1/2 % bichrome and
3 % tartar.

Many hat dyers add 1/2—1 % sulphuric or oxalic acid to the mordant bath. Enter the goods luke warm, work for about 1/4 hour without steam, bring to the boil within 1/2 hour and boil for 1 1/2 hours.

After mordanting, rinse well and hydro-extract.

b) Dyeing.

Prepare the dye bath with 5 % acetate of ammonia and the requisite quantity of Mordant colour. Enter the hats, turned inside out, at 100—120° Faht., work for 1/2 hour without steam and then turn them. Bring to the boil in 1/2—3/4 hour, and boil for 1/2 hour. Afterwards add 1—2 % acetic acid in the usual manner, and boil for another 1/2—3/4 hour.

B) Acid Dyeing and after-chroming.

a) Dyeing.

Prepare the bath with 30—40 % Glauber's salt crystals and 4 % sulphuric acid, add the well dissolved and sieved colour, then the hats inside out, work for 10 mins. without steam, bring to the boil within 1 hour, and boil for another hour. Afterwards turn the hats.

Remarks: Many hat dyers take 1—2 % acetic acid instead of 4 % sulphuric acid, and add later on sulphuric acid to exhaust the bath.

b) After-Chroming.

Allow to cool down to 130—140° Faht., add 1—3 % bichrome or chromate of soda, enter the goods, work for 10 mins. without steam, bring to the boil quickly and boil for 1/2—3/4 hour. If necessary the goods can now be brought up to shade. Lately hats are dyed in the half-planked state instead of fully-planked state, as same can be penetrated better. Colours employed

for this class of work must be also fast to acid as well as possessing the other properties necessary, so that they can afterwards stand the acid milling with sulphuric acid.

144. **Mordant colours** which dye so-called Universal Yarns, consisting of mordanted and unmordanted wool, with the addition of some acetic acid, **dyeing the unmordanted wool but slightly,** however, the same shade as the mordanted wool:

Yellows: Fast Printing Yellow 3 G
Anthracene Yellow in powder and in paste
Greens: Alizarine Green in powder and in paste (only fairly good, dyes unprepared wool greyish-green).
Blues: Alizarine Blue S and S R in paste and in powder
Celestine Blue B
Violets: Chrome Violet in paste
Browns: Alizarine B X in powder and in paste
Alizarine Orange R in powder and in paste, G in paste
Alizarine Red II A B in paste, W in powder
Anthracene Brown R, G in paste and in powder, G G, W in paste
Blacks: Alizarine B X in paste and in powder
Alizarine Green in powder and in paste
Anthracene Yellow in powder and in paste
Alizarine Blue S and S extra in paste and in powder
Alizarine Green in powder and in paste
Anthracene Brown R, G in paste and in powder, G G, W in paste

145. **Benzidine colours,** which are adapted for **dyeing** wool:

Reds: Benzo Bordeaux 6 B
Benzo Fast Red L, G L
Benzo Fast Scarlet 4 B S, 5 B S, 8 B S, G S
Benzo Purpurine 1 B, 4 B, 6 B, 10 B
Benzo Rhoduline Red B, 3 B
Brilliant Congo R
Brilliant Geranine B, 3 B

Reds: Brilliant Purpurine R
Congo Red 4R
Congo Rubine
Delta Purpurine 5B, 7B
Diamine Red B, 3B
Geranine BB, G
Hessian Purple N
Rose Azurine B, G

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Mikado Orange
Orange TA
Pluto Orange G

Yellows: Benzo Fast Yellow 5GL
Chrysamine G, R
Chrysophenine GS
Curcumine S
Thiazole Yellow G, R

Greens: Benzo Dark Green B, GG
Benzo Green BB, G

Blues: Benzo Azurine G, 3G
Benzo Blue BX, RW, 2R, 4R
Benzo Cyanine B, R
Benzo Fast Blue 5R
Brilliant Azurine B, G, 5G
Chicago Blue B
Diazo Black B, R, 3B, R extra

Violets: Azo Violet
Benzo Fast Violet R (red)
Benzo Violet R, RL extra (red)
Congo Corinth B, G

Browns: Benzo Brown B, NB, G, GG, 5R, R extra, &c.
Benzo Chrome Brown B, G, R, 3R, BS, 5G
Cotton Brown I, II, III
Direct Fast Brown B
Pluto Brown GG, NB, R

Greys: Diazo Fast Black SD

Blacks: Benzo Fast Black
Direct Blue Black B, 2B, N

Blacks: Direct Deep Black E, E extra, G, RW, RW extra
Pluto Black G, FR

Directions for Dyeing.

Enter the well cleaned wool at 85—105° Faht. (Recipe see under No. 105, page 167) into the dye liquor containing the well dissolved and filtered Benzidine colour and 2—3% acetate of ammonia (or 2% acetic acid), bring the bath slowly to the boil within ¾ hour, and dye for ¾ hour at the boil. Should the bath not be thoroughly exhausted, add carefully about 2% acetic acid, boil until the liquor is quite clear, rinse well and dry.

Another method of dyeing is as follows: Dye for 1 hour at the boil with the requisite quantity of colour and the addition of 10% common salt (or Glauber's salt crystals) with or without 2% acetic acid. Sometimes the goods are dyed with the addition of 10% Glauber's salt crystals and 5% acetate of ammonia.

146. **Benzidine colours**, which are adapted for the **printing** of **woollen cloth:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Red L, GL
Benzo Fast Scarlet 4BS, 8BS, GS
Benzo Purpurine 1B, 4B, 6B
Benzo Red SG, 10B
Brilliant Congo R
Brilliant Geranine B, 3B
Delta Purpurine 5B
Geranine BB, G
Rose Azurine B, G

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R

Yellows: Chloramine Yellow GG, M
Chrysamine G, R
Chrysophenine, GS
Curcumine S
Direct Yellow R, R extra
Thiazole Yellow G, R

Greens: Benzo Dark Green B, GG

Greens: Benzo Green BB, G
Blues: Benzo Azurine G
Benzo Blue 2B, 3B, RW
Benzo Sky Blue
Brilliant Benzo Blue 6B
Violets: Benzo Bordeaux 6B
Benzo Fast Violet R
Benzo Violet R, RL extra
Chloramine Violet R
Congo Corinth B, G
Heliotrope BB (Bordeaux)
Browns: Benzo Chrome Brown R
Cotton Brown II
Greys: Benzo Fast Black
Blacks: Benzo Fast Black

For prints with Benzidine colours on woollen cloth it is best to employ well cleaned and chlorinated material (prepared with tin) (Recipes see pages 168 under No. 105, and pages 169–170). British gum is used as a thickening agent. Steam the printed material for 1 hour without pressure, wash and dry.

General Recipe for Printing.

Boil:

2	oz.	or 20	grms.	**Benzidine Colour**
1 1/8	pints	» 300	»	British gum and
3 1/4	»	» 660	»	water, then add
2	oz.	» 20	»	phosphate of soda
		1000	grms.	

Benzidine colours are sometimes also printed neutral direct without phosphate of soda. Some Benzidine colours are fixed better if acetic acid instead of phosphate of soda is taken. For those Benzidine colours which are not perfectly fast to steaming, acetic acid is substituted by five times the quantity of acetate of ammonia.

147. **Benzidine colours,** which are employed in **wool dyeing** and **printing** on account of their **good fastness to light:**

Reds: Geranine G
Oranges: Congo Orange G
Yellows: Chloramine Yellow M
Chrysamine G, R

Yellows: Chrysophenine G
Curcumine S
Greys: Benzo Fast Black
Blacks: Benzo Fast Black

148. **Benzidine colours,** which when either **dyed** or **printed** on **wool** are **fast to alkali** (resisting 20% ammonia:

Reds: Benzo Fast Pink 2BL
Benzo Fast Red GL
Benzo Fast Scarlet 4BS, GS, 8BS
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Rhoduline Red B, 3B
Brilliant Congo G, R
Brilliant Geranine B, 3B
Brilliant Purpurine R
Congo Red, 4R
Congo Rubine
Delta Purpurine 5B, 7B
Diamine Red B, 3B
Geranine G
Hessian Purple N
Rose Azurine B, G
Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Pluto Orange G
Yellows: Chloramine Yellow M
Chrysophenine, GS
Greens: Benzo Green BB, G
Blues: Benzo Blue 2B, 3B, RW
Benzo Cyanine B
Benzo Fast Blue 5B
Benzo Sky Blue, concentrated
Brilliant Azurine B (fairly good)
Chicago Blue B
Diazo Black B
Violets: Benzo Bordeaux 6B
Benzo Fast Violet R
Chloramine Violet R

Browns: Benzo Brown B, G, NB
Benzo Chrome Brown B, 3R, BS
Benzo Dark Brown
Cotton Brown I, II, III
Direct Fast Brown B
Pluto Brown GG, NB, R

Blacks: Benzo Fast Black
Direct Blue Black B, 2B, N
Direct Deep Black E, G, R
Pluto Black G, FR

149. **Benzidine colours,** which when **dyed** or **printed on wool** are **fast to stoving:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Red L
Benzo Fast Scarlet 4BS, GS, 8BS
Benzo Purpurine 1B, 4B, 6B
Benzo Red SG,
Benzo Rhoduline Red B, 3B
Brilliant Congo R
Brilliant Geranine B, 3B
Brilliant Purpurine R
Delta Purpurine 5B, 7B
Diamine Red B, 3B
Geranine BB, G
Hessian Purple N
Rose Azurine B

Oranges: Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Pluto Orange G
Toluylene Orange G

Yellows: Chloramine Yellow M
Chrysamine G, R
Chrysophenine, GS
Curcumine S
Direct Yellow R, R extra
Thiazole Yellow G, R

Greens: Benzo Dark Green B, GG
Benzo Green BB, G

Blues: Benzo Azurine G, 3G
Benzo Blue 2B, 3B, BX, RW

Blues: Benzo Cyanine B
Benzo Sky Blue
Brilliant Azurine 5G, B
Brilliant Benzo Blue 6B
Chicago Blue B
Violets: Azo Violet
Benzo Violet R
Congo Corinth B, G
Chloramine Violet R
Browns: Benzo Chrome Brown 5G (fairly good)
Direct Fast Brown B
Pluto Brown GG, NB, R
Blacks: Benzo Fast Black
Direct Blue Black B, 2B, N
Direct Deep Black E, E extra, G, R, RW, RW extra
Pluto Black G, FR

150. **Benzidine colours,** which when **dyed** or **printed** on **wool** are **fast to rubbing:**

Yellows: Chrysophenine
Blacks: Benzo Fast Black

151. **Benzidine colours,** which when **dyed** on **wool** are **fast to water** by the side of **white wool:**

Reds: Benzo Fast Red GL (fluoride of chrome)
Benzo Purpurine 1B, 4B, 6B, 10B
Brilliant Congo R
Brilliant Geranine B, 3B
Brilliant Purpurine R
Congo Red
Delta Purpurine 5B, 7B
Diamine Red B, 3B
Geranine BB, G,
Hessian Purple N
Oranges: Congo Orange G, R
Orange TA
Toluylene Orange G (almost good)
Yellows: Chrysamine G, R
Chrysophenine
Thiazole Yellow G, R
Blues: Benzo Azurine G
Brilliant Azurine 5G
Violets: Azo Violet
Browns: Benzo Chrome Brown B, G, R

152. **Benzidine colours,** which when **dyed** or **printed** on **wool** are **fast to milling** by the side of **white wool:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Scarlet 4BS, GS
Benzo Purpurine 4B, 6B, 10B
Delta Purpurine 5B, 7B
Diamine Red B, 3B
Geranine G
Oranges: Benzo Fast Orange S
Congo Orange G (fairly good)
Yellows: Chloramine Yellow M
Chrysophenine
Thiazole Yellows G, R
Blues: Benzo Fast Blue 5R
Violets: Benzo Violet RL extra
Greys: Benzo Fast Black
Blacks: Benzo Fast Black

153. **Benzidine colours,** which when **dyed** on **wool** are **fast to carbonisation** (with sulphuric acid):

Oranges: Benzo Orange R
Congo Orange G
Yellows: Chrysophenine GS

The recipe for carbonising is the same as given under No. 114, page 180—181 for Acid Wool colours.

154. **Benzidine colours,** which are employed for **dyeing slubbing** in a machine:

Reds: Geranine BB
Oranges: Orange TA
Yellows: Chloramine Yellow M
Chrysophenine G
Browns: Benzo Chrome Brown B

The well cleaned slubbing (see recipe under No. 121 and 122, pages 192—193) is dyed in the same way as described under No. 145, page 234.

155. **Benzidine colours,** which are adapted for **slubbing printing:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Red GL
Benzo Fast Scarlet 4BS, GS
Benzo Purpurine 4B
Brilliant Congo R

Reds: Brilliant Geranine B, 3 B
Brilliant Purpurine 4 B
Delta Purpurine 5 B
Diamine Red 3 B
Geranine BB, G
Oranges: Benzo Fast Orange S
Congo Orange G, R
Yellows: Chloramine Yellow GG, M
Chrysophenine, GS
Curcumine S
Direct Yellow R
Thiazole Yellow G, R
Greens: Benzo Green G

Recipe for Slubbing Printing.

Print the well cleaned slubbing (see process under Nos. 121 and 122 pages 192 and 193) with Benzidine colour thickened with British gum and with or without ½ pint acetic acid per 7 pints printing paste, steam for 1 hour without pressure and wash.

General Directions for Printing.

Boil:

3—5	oz.	or	30— 50 grms.	Benzidine colour
1½	pints	»	300 »	British gum and
3⅛—3¼	»	»	670—650 »	water
			1000 grms.	

Remarks: Some Benzidine colours such as Geranine G, Brilliant Geranine B, etc. are rendered faster to water by an addition of 3 oz. chrome alum per 5 pints print paste (with the addition of 7 oz. acetic acid).

156. **Sulphon colours** (and Benzidine colours), which are adapted for the **dyeing** of **wool**; those qualities marked with an asterisk also suit for **slubbing printing:**

Reds: *Anthracene Red
*Geranine BB, G
Oranges: *Congo Orange G, R
Yellows: *Chrysophenine G
Greens: *Alizarine Green B, SS
Blues: *Brilliant Sulphon Azurine R
*Sulphon Azurine D
Sulphon Cyanine G, GR extra, 3 R, 5 R extra
Browns: New Sulphon Brown R
New Sulphon Dark Brown

Browns: Sulphon Brown R
Greys: Benzo Fast Black
Blacks: Jet Black G, R
Sulphon Blue Black
Sulphon Black G, R, 3B, 4BT
Sulphon Cyanine Black B, 2B

a) Dyeing of Sulphon Colours.

It is best to clean the pieces in hot water containing ammonia. It is advantageous when the pieces are very much saturated with oil, etc. to boil them up for 1 hour with 3 % bichrome before dyeing and then rinse well.*

Dye the well cleaned wool (Recipe see under No. 105, page 168) with Sulphon colour and the addition of 5—8 % acetate of ammonia or 5—10 % Glauber's salt crystals. Enter the goods at 100° Faht., bring slowly almost up to the boil (200° Faht.) within ¾ hour, and whilst running at this temperature for ¾ hour add if necessary 1—2 % acetic acid, diluted with water, until the liquor is quite clear. Carbonised pieces must be well acidulated, otherwise the Sulphon colours rush on too quickly. Care should be taken that the baths are not alkaline but always slightly acid. The Sulphon Cyanines ars not affected when boiled for a long time in a slightly acid bath, but if the dye liquor is alkaline the colour is decomposed.

After dyeing, rinse. The shades are very fast, possessing very good fastness to light.

Loose wool and yarns are simply dyed with the addition of Glauber's or common salt, if necessary with the addition of a little acetate of ammonia or acid; the best results, as regards level shades, are obtained when dyed in this manner. If the woollen material is alkaline, then acid must be added, and apart from sufficient acid it is advisable to add to the dye bath ¼—½ % bichrome.

In order to increase the fastness to light, steaming and ironing of shades dyed with Sulphon Cyanines, after-treat piece goods with ½ % bichrome and ½ % copper sulphate.

* The goods have of course to be cleaned with ammonia or the like before subjecting them to the treatment with bichrome.

b) Printing with Sulphon Colours.

Real Sulphon colours can be employed for slubbing printing, but the printed material has to be very carefully steamed as the colours are easily liable to decompose when steamed too severely. Steam therefore for ½—1 hour without any pressure, best with the addition of chlorate of soda or bromate of potash, and if necessary with acetate of ammonia or acetic acid.

General Recipe for Printing.

Boil:

3	oz.	or 30	grms.	**Sulphon colour**
1½	pints	» 300	»	British gum
1	oz.	» 10	»	chlorate of soda and
2¾	pints	» 560	»	water, then add
½	»	» 100	»	acetic acid 9° Tw. or acetate of ammonia
		1000	grms.	

As regards the printing of Benzidine colours which have similar properties to those of the Sulphon dyestuffs, we refer you to the process under No. 146, page 235.

157. **Sulphon colours** (and Benzidine colours), which when **dyed** or **printed** on **wool** are very **fast to light:**

Reds: Anthracene Red
Oranges: Congo Orange G, R
Yellows: Chrysophenine
Greens: Alizarine Green D
Blues: Brilliant Sulphon Azurine R (in dark shades)
Sulphon Azurine D (in dark shades)
Sulphon Cyanine G, G R extra, 3 R, 5 R extra
Blacks: Sulphon Blue Black
Sulphon Black 3 B, 4 B T, G, R
Sulphon Cyanine Black B, 2 B

158. **Sulphon colours** and (Benzidine colours), which when **dyed** on **wool** are **fast to alkali** (resisting **20 % ammonia**):

Reds: Anthracene Red (almost good)
Geranine G
Oranges: Congo Orange G, R
Yellows: Chrysophenine
Greens: Alizarine Green D, SS (almost good)
Blues: Brilliant Sulphon Azurine R
Sulphon Azurine D

Blues: Sulphon Cyanine G, G R extra, 3 R, 5 R extra
Greys: Benzo Fast Black
Blacks: Jet Black G, R
Sulphon Blue Black
Sulphon Black 3 B, 4 B T, G, R
Sulphon Cyanine Black B, 2 B

159. **Sulphon colours,** which when **dyed** on wool are **fast to stoving:**

Reds: Anthracene Red
Blues: Sulphon Azurine D
Blacks: Sulphon Cyanine Black B, 2 B

160. **Sulphon colours** (and Benzidine colours), which when **dyed** on **wool** are **fast to rubbing:**

Yellows: Chrysophenine
Blues: Sulphon Cyanine G, G R extra, 3 R, 5 R extra
Sulphon Acid Blue B, R
Browns: New Sulphon Dark Brown
New Sulphon Brown R
Greys: Benzo Fast Black
Blacks: Sulphon Black 3 B, 4 B T, R

161. **Sulphon colours** (and Benzidine colours), which when **dyed** on **wool** are **fast to water** by the side of **white wool:**

Reds: Anthracene Red
Geranine B B, G
Oranges: Congo Orange R
Yellows: Chrysophenine
Blues: Brilliant Sulphon Azurine R
Sulphon Azurine D
Sulphon Cyanine G, G R extra, 3 R, 5 R extra
Browns: New Sulphon Brown R
New Sulphon Dark Brown
Blacks: Jet Black R

162. **Sulphon colours** (and Benzidine colours), which when **dyed** on **wool** are **fast to milling** by the side of **white wool:**

Reds: Anthracene Red (moderately)
Geranine G
Oranges: Congo Orange G, R
Yellows: Chrysophenine
Greens: Alizarine Green S S
Blues: Brilliant Sulphon Azurine R

Blues: Sulphon Azurine D
Sulphon Cyanine G, GR extra, 3R, 5R extra
Greys: Benzo Fast Black
Blacks: Jet Black G, R
Sulphon Cyanine Black B, 2B

163. **Sulphon colours** (and Benzidine colours) which when **dyed** on **wool** are **fast to carbonisation** with sulphuric acid:

Reds: Anthracene Red
Oranges: Congo Orange G, R
Yellows: Chrysophenine
Blues: Brilliant Sulphon Azurine R
Sulphon Azurine D
Sulphon Cyanine G, GR extra, 3R, 5R extra
Blacks: Sulphon Blue Black
Sulphon Black 3B, G, 4BT, R
Sulphon Cyanine Black B, 2B

The carbonising process for Sulphon colours is the same as stated under No. 114, page 180 for Acid Wool colours.

164. **Sulphon colours** (and Benzidine colours), which can be employed for **dyeing slubbing** in a machine:

Reds: Geranine BB
Yellows: Chrysophenine
Greens: Alizarine Green SS
Blues: Sulphon Cyanine G, GR extra, 3R, 5R extra
Blacks: Sulphon Cyanine Black B, 2B

Sulphon colours are dyed on well cleaned slubbing (See under Nos. 121 and 122, pages 192 and 193) as follows: Stir up the Sulphon colour with cold water to a thin paste, and for 100 lbs. of slubbing add to the dye bath

20 lbs. Glauber's salt crystals
1/9—1 » bichrome (for light to dark shades)

and about 1 pint of acetate of ammonia per 125 gallons water; fill the dye bath with 1/3rd the quantity of water necessary for dyeing, boil for 5 mins. and then fill up with cold water. Commence dyeing at 140° Faht., bring to 200° Faht. in 3/4 hour, and continue at this temperature for another 3/4 hour. If the bath is not thoroughly exhausted add 1/2—3/4 pint acetic acid per 125 gallons, and dye until the liquor is quite clear.

165. **Sulphon colours,** which when **after-treated with chrome** do not alter in shade, for which reason they suit for shading mordant dyestuffs:

Reds: Anthracene Red
Greens: Alizarine Green SS
Blues: *Sulphon Cyanine G, GR extra, 3 R, 5 R extra

Sulphon Colours, dyed according to the recipe under No. 156, page 241, can be after-chromed in the manner described under No. 129, page 212 for Mordant dyestuffs.

Remarks: The after-treatment in a gently boiling bath for ¼ hour with 2—3 % copper sulphate improves the fastness to steaming of Sulphon Cyanines considerably.

166. **Sulphon colours** (and Benzidine colours) which when **dyed on wool** can be **discharged** with **tin crystals:**

Reds: Anthracene Red
Geranine BB, G
Oranges: Congo Orange G, R
Yellows: Chrysophenine
Greens: Alizarine Green D, SS
Sulphon Blue Black
Blues: Brilliant Sulphon Azurine R (yellow)
Sulphon Azurine D (yellow)
Greys: Benzo Fast Black
Black: Sulphon Cyanine Black B and 2B (yellow)

The recipe for discharging, etc. is the same as stated under No. 117, page 185 for Acid Wool Colours.

167. **Sulphon colours** (and Benzidine colours) which when **dyed on wool** can be **discharged** with zinc powder:

Reds: Anthracene Red
Geranine BB, G
Greens: Alizarine Green D, SS
Sulphon Blue Black
Blues: Brilliant Sulphon Azurine R (yellow)
Sulphon Azurine D (yellow)
Blacks: Sulphon Cyanine Black B and 2B (yellow)

The recipe for discharging, etc. is the same as given under No. 119, pages 189 and under No. 26, page 50.

* Those products marked with an asterisk are fast to milling.

168. **Basic colours,** which can be employed for **dyeing wool:**

Reds: Brilliant Rhoduline Red B
Diamond Fuchsine Cryst.
New Magenta
Rhodamine B, G, B extra, G extra
Rhoduline Red B, G
Saffranine FF extra

Oranges: Chrysoidine Cryst.

Yellows: Auramine O, I, II, concentrated

Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Emerald Green

Blues: New Victoria Blue B
Rhoduline Sky Blue 2B
Victoria Blue B

Violets: Brilliant Rhoduline Purple R
Methyl Violet 7B–1B, 1R–5R, RB
Rhoduline Heliotrope B
Rhoduline Violet

Browns: Bismarck Brown F, FF, M, R extra

Basic colours should be dissolved either in condensed water, or before dissolving the colour with ordinary water stirred up with a little cold acetic acid, as owing to the calcareous condition of the water the dyestuff easily precipitates as a resinous base. It is also of advantage to correct the water used in the dye bath, taking according to the hardness of the water $^1/_2$–1 $^1/_2$ pints acetic acid 9° Tw. per 12 $^1/_2$ gallons water. A slight excess of acid is not detrimental, as it only causes the colour to fall on more slowly. As is well known, Basic colours, without any acid, rush on the fibre, thus producing uneven shades.

Dye the well cleaned wool therefore with the thoroughly dissolved and filtered colour and the addition of 1–2% acetic acid or 2–4% alum; a great excess of acid causes too much colour to remain in the bath. By adding the colour solution in several portions more level shades ensue. The goods are generally entered luke warm, and the bath brought to 175–190° Fahr. or up to the boil within $^3/_4$ hour, with the exception

for Auramine, which should not be dyed at a higher temperature than 160° Faht. When dyed, rinse well.

169. **Basic colours** which can be **dyed in a soap bath** and afterwards stoved if necessary:

Reds: (Diamond Fuchsine)
Rhodamine B, G, B extra, G extra
Saffranine FF extra
Yellows: Auramine O, I, II, conc.
Greens: (Brilliant Green Crystals)
Blues: Victoria Blue B
Violets: (Methyl Violet 1B—7B, RB, 1R—5R)

Dye in a luke warm soap bath (5% olive oil soap) and if necessary, should the water be hard, with the addition of a little soda, and afterwards hydro-extract not too severely but uniformly, stove at once in the stoving chamber, rinse luke warm and dry.

170. **Basic colours,** which can be **printed** on **wool:**

Reds: Brilliant Rhoduline Red B
Rhodamine B, G, B extra, G extra, 5G
Rhoduline Red B, GP in paste
Saffranine FF extra
Oranges: Coriphosphine O, OX, OX extra
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
Blues: New Victoria Blue B
Rhoduline Blue R, G extra
Rhoduline Sky Blue 2B
Turquoise Blue BB, G
Violets: Brilliant Rhoduline Purple R
Methyl Violet 1B—7B, 1R—5R, RB
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Browns: Bismarck Brown F
Greys: New Fast Grey

General Recipe for Printing.

Dissolve:

1—2 oz.	or	10— 20 grms.	**Basic colour** in
$6^2/_5$—$6^1/_5$ noggs.	»	320—310	»	water and
$1^2/_5$ »	»	70	»	acetic acid 9° Tw. (30%) then thicken with
5 pints	»	600	»	gum solution 1 : 1 or British gum solution
		1000 grms.		

$^1/_4$—$^1/_2$ pint or 50—100 grms. tannic acid solution 1 : 1 of printing paste can also be added.

Print on chlored or unchlored woollen cloth, steam for 1 hour without pressure, wash and dry; (if necessary pass through a cold tartar emetic bath, in the proportion of 1 oz. per 5 pints water). Basic colours when printed on wool with the addition of tannic acid, are rendered somewhat faster to washing, but as a rule they appear duller in shade.

171. **Basic colours,** which when **dyed** or **printed** on wool are **fast to alkali** (resisting **20% ammonia**):

Reds: Brilliant Rhoduline Red B
Rhoduline Red B, G, GP in paste
Saffranine FF extra
Yellows: Auracine G
Auramine O, I, II, concentrated
Blues: New Victoria Blue B*
Turquoise Blue G (almost good)
Victoria Blue B*
Violets: Rhoduline Heliotrope B, 3 B
Rhoduline Violet
Browns: Bismarck Brown F, FF, M, R extra
Greys: New Fast Grey (almost good)

172. **Basic colours,** which when **dyed** or **printed** on wool are **fast to stoving:**

Reds: Brilliant Rhoduline Red B
Rhodamine B, G, B extra, G extra
Rhoduline Red B, G
Saffranine FF extra
Yellows: Auramine O, I, II, concentrated

* These colours are fast to milling by the side of white wool.

Blues: New Victoria Blue B
Rhoduline Blue R
Victoria Blue B
Violets: Brilliant Rhoduline Purple R
Rhoduline Heliotrope B, 3 B

173. The following **wool colours,** when **dyed** on **loose shoddy** are adapted for producing shades **fast to milling:**

a. Mordant, b. Acid, c. Basic, d. Benzidine, e. Sulphon colours.

Reds: a. Alizarine Red in paste and in powder
Anthracene Red
Cloth Red 3 G extra, 3 B extra
Yellows: a. Fast Printing Yellow 3 G in powder
Chrome Yellow R extra in paste and in powder
Diamond Flavine G in paste and in powder
d. Chloramine Yellow M, HW
Chrysophenine
Thiazole Yellow G and R
Greens: a. Alizarine Green CE and CG extra in paste and in powder, CK in powder
Alizarine Green in paste and in powder, S and SW in paste
Alizarine Green D, SS
b. Brilliant Acid Green 6 B
Fast Green extra, CR
Blues: a. Alizarine Blue GG, GW and R double, BM in paste, S, S extra, SR, SR extra, SW in paste and in powder
Alizarine Blue IIX, BR, HJ in paste and in powder
Alizarine Blue BAG and BAR in paste and in powder
Celestine Blue B in powder
Gallamine Blue in paste
Gallo Cyanine in paste and in powder
b. New Patent Blue GA
c. New Victoria Blue B
Victoria Blue B
e. Sulphon Cyanine G, G extra, 3 R, 5 R extra
Violets: b. Alkali Violet LR

Violets: b. Acid Violet 4B extra, 4BN extra, 6BN, 6BN extra

Browns: a. Acid Anthracene Brown R, T, W
Alizarine Red WR, WRB, WB, X in paste, W, W extra, WS, WSM, SB and PS in powder
Alizarine Orange R in powder and in paste, G, GG, W paste
Alizarine Red Brown R
Anthracene Brown G, R, GG and W in paste and in powder

Greys: a. Alizarine Black IA in paste and in powder
Alizarine Black B and 3B in paste and in powder

Blacks: a. Alizarine Black B and 3B in paste and in powder
Diamond Black F, GA, NG, NR, 2B, PV
b. Wool Black B (almost good)

174. The following **wool colours** are employed for **dyeing loose shoddy** and **pieces** (**not fast to milling**):
a. Mordant, b. Acid, c. Basic, d. Benzidine, e. Sulphon colours.

Reds: b. Azo Crimson L, S
Azo Fuchsine G, S, GN extra
Brilliant Croceine 3B
Carmoisine B
Croceine Scarlet 3B
Double Ponceau 1R–4R
Fast Red A, NS
Scarlet 3B, 6062
c. Saffranine FF extra

Oranges: b. Orange IIB

Yellows: c. Auramine O, I, II, conc.
Direct Yellow R, R extra
b. Fast Yellow extra
Indian Yellow G, R
Metanile Yellow concentrated
Naphtole Yellow S
New Yellow extra concen.
Quinoline Yellow

Greens: b. Acid Green 3B, 8B, GG extra, GB extra
Fast Green bluish (liquid quintuple)

Greens: b. Fast Light Green
d. Benzo Dark Green B, G G
Blues: a. Alizarine Blue B R 3 G in paste and in powder
b. Brilliant Wool Blue B extra
New Patent Blue B, 4 B
Sulphon Acid Blue B, R
Wool Blue N extra, R extra
Soluble Blue 12232, R P
Violets: b. Acid Violet 8 B extra, 12 B, 7 B
Fast Acid Violet 10 B
c. Methyl Violet 1 B
Browns: d. Pluto Brown R
Blacks: b. New Victoria Black B,
New Victoria Black Blue
Phenole Blue Black 3 B
Phenylamine Black 4 B
Phenol Black S S
Victoria Black B, G, 5 G
Victoria Black Blue
Wool Black 4 B, N 4 B
d. Direct Deep Black E
Pluto Black B S extra
e. Sulphon Black 3 B, 4 B T, G, R

Directions for Dyeing Shoddy

a) with Mordant colours, refer to No. 127, page 207 and 208.
b) with Acid colours, refer to No. 105, pages 169/170.
c) with Basic colours, refer to No. 168, page 246.
d) with Benzidine colours, refer to No. 145, page 234.
e) with Sulphon colours, refer to No. 156, pages 241/2.

Shoddy must be thoroughly cleaned and freed from soap, as it being an extremly heterogeneous material, it is oftentimes more difficult to dye than ordinary wool. The different shades of the raw-materal in the shoddy have to be covered uniformly, which is of course only possible when dyed dark shades. If the shoddy has to be dyed a light shade, then the colour on the raw-material has to be stripped first as much as possible. A good method of stripping is to boil for $^1/_2$—1 hour in a bath containing, according to the resistance of the colour on the material, 4—7 % bichrome and 3—10 % sulphuric acid.

Shoddy is sometimes stripped with a hydrosulphite solution prepared as follows: add carefully 60 ccm. or ¼ pint concentrated ammonia solution to 1 litre or 4 pints bisulphite of soda 32° Tw., and then under constant stirring add carefully 60 grms. or 6 oz. zinc powder. Care has to be taken that the solution of 32° thus obtained does not get above 60—70° Faht., otherwise cool down from the outside. Allow the hydrosulphite solution thus obtained to settle down over night in closed up vessels. For stripping purposes a hydrosulphite solution of 8—15° Tw. is sufficient. Work the shoddy in this solution for 1 hour quite cold, warm up to 140° Faht., treat at this temperature for ¾ hour, and then wash well.

Despite the fact that colours fast to milling have been employed for the dyeing of shoddy, not previously stripped, some colour will come of in the milling. This bleeding is not to be attributed to the colour employed in dyeing, but to the colour on the raw-material used for the shoddy. In order to prevent such bleeding, treat the shoddy for 1 hour at 100° Faht. with a solution of 10% soda ash before stripping with bichrome or hydrosulphite. If the colour stands this treatment, it will also not come off in the subsequent milling.

Remarks: If dark shades dyed with Alizarine Colours have to be merely made a little lighter, the pieces can be treated in a warm diluted solution of oxalic acid, sulphuric acid or soda.

175. The following wool colours are adapted for the **dyeing of woollen pieces containing white cotton** or **ramie checking threads:**

a. Acid colours, b. Mordant colours, c. Sulphon colours.

Reds: a. Acid Magenta
Azo Bordeaux
Azo Fuchsine B, G, 6B (fairly good), S
Azo Crimson S
Azo Phloxine 2G
Brilliant Croceine 3B
Brilliant Ponceau 4R, 5R
Carmoisine B
Croceine Scarlet 1BX, 3BX, 1R, RX, 3B, 7B

Reds: a. Fast Red NS
Fast Acid Magenta B
Ponceau 1R, 2R, 3R

Oranges: a. Croceine Orange G, R
Fast Light Orange G
Orange II B

Yellows: a. Fast Printing Yellow 3G
Fast Yellow extra (fairly good)
Fast Light Yellow G, 3G
Indian Yellow R
Naphtole Yellow S
Quinoline Yellow
Tartrazine

b. Anthracene Yellow in paste and in powder (Chrome)
Chrome Yellow D (Chrome)

Greens: a. Acid Green BB extra, GG extra
Alizarine Green CG extra in paste and in powder
Alkali Fast Green B, G
Brilliant Acid Green 6B
Fast Green CR, extra bluish, bluish
Fast Light Green
Parrot Green
Wool Green BS

b. Alizarine Green CE and CG extra in paste and in powder (Chrome)
Alizarine Green in paste and in powder, S and SW in paste (Chrome)
Alizarine Green D, SS (Chrome)

Blues: a. Acid Cyanine B, R
Alizarine Blue SAP, SAE in paste and in powder
Alizarine Blue BRG, BR3G in paste and in powder
Azo Acid Blue 6B
Brilliant Wool Blue B extra (fairly good) G extra (good)
Fast Acid Blue B, B extra
Intensive Blue
New Patent Blue GA, B, 4B
Sulphon Acid Blue B, R

Blues: a. Victoria Navy Blue B
Wool Blue N extra, R extra (rather good) S, 22 113
b. Alizarine Blue S, S extra, SR, SR extra, SW in paste and in powder, GG, GW and R double, BM in paste (Chrome)
Alizarine Blue A, HX, HJ, NS, NSG in paste and in powder, NSV in paste (Chrome)
Alizarine Blue BAG and BAR in paste and in powder (Chrome)
Alizarine Blue BR3G in paste and in powder (Chrome)
Gallo Cyanine in paste and in powder (Chrome)

Violets: a. Acid Violet 4RS
Alizarine Blue JR in paste and in powder
Fast Acid Violet 10B
Victoria Violet 4BS

Browns: b. Acid Anthracene Brown R, T, W in powder (Chrome)
Alizarine Red W, W extra, WS, WSM, SB, WST in powder (Chrome)
Anthracene Brown G and R in paste and in powder, GG and W in paste (Chrome)

Blacks: a. Acid Black 4BL (very good) LD, FL (good), 5B (rather good)
Acid Chrome Black B (good) G (very good)
Cashmere Black B, 6B (good), T (very good)
Naphtaline Acid Black 4B, S (good)
Naphtol Black 2B (fairly good)
Phenole Black SS (rather good)
Phenyl Blue Black N (rather good)
Victoria Black B (good)
Wool Black B (rather good)
b. Acid Chrome Black B (good) G (very good) (Chrome)

Blacks: b. Alizarine Black IA in paste and in powder (Chrome)
Diamond Black F, FB, 2B and NG (fairly good), GA (Chrome) (rather good)
c. Sulphon Cyanine Black B (good) G (very good)

a) Dyeing with Acid colours.

Acid colours are dyed for 1 hour at the boil with the addition of
20% Glaubers' salt cryst. and
5% sulphuric acid.
In order to obtain as white effects as possible, add, if necessary, 2—3% sulphuric acid.

Remarks: Fast Printing Yellow 3 G and Phenylamine Black 4B are dyed with the addition of 3% acetic acid, and the bath exhausted with 1 1/2 % sulphuric acid.

b) Dyeing of after-chromed colours.

Add 2—4% acetic acid (and Glauber's salt) to the dye bath, enter the goods at 140° Faht. bring to the boil, and dye for about 1 hour at this temperature; in case the bath is not thoroughly exhausted add some sulphuric acid. Afterwards cool down to 160° Faht., and treat for about 1/4 hour with 1 1/2 % bichrome. Bring up to the boil again and continue boiling for another 1/2 hour.

Remarks: Acid Anthracene Browns W, T and R are dyed with the addition of 20% Glauber's salt and 3—4% acetic acid for 1 hour at the boil, and the bath exhausted with about 1 1/2 % sulphuric acid. Afterwards allow to cool down to 160° Faht. and aftertreat with 1 1/2 % bichrome.

c) Dyeing on chrome mordant.

Dye the respective colours in the usual manner on the material previously mordanted with chrome and tartar, with the additon of 3% acetic acid, enter the goods at 80—100° Faht., bring to the boil within 3/4 hour and boil for another 3/4 hour, (see recipe under No. 127 page 207/8).

176. **Wool colours** which when **dyed on wool** yield the **indigo test** on spotting with **nitric acid:**

Reds: Alizarine Red WS (alum)

Yellows: Tartrazine

Greens: Acid Green BB extra, BBN, G extra, GB extra, GG extra, 3BX
Alizarine Green in paste and in powder, S and SW in paste (Chrome)

Blues: Alizarine Blue G, GW, R (all three qualities produce a yellow, which is a trifle redder than spotted Indigo)

Violets: Acid Violet 5B, 6B, 6BN, HW, R, 3R, 3R extra, 4RS, 7B
Galleine paste and powder (chrome)

Half-wool.

177. **Benzidine colours,** which can be employed in **dyeing half-wool,** dyeing the **wool** and the **cotton the same** or **almost the same shade** at the boil in a neutral bath containing Glauber's salt:

Reds: Benzo Fast Red GL, L
Benzo Purpurine 1B, 4B, 10B
Benzo Red SG
Benzo Rhoduline Red B, 3B
Brilliant Geranine B
Brilliant Purpurine R
Congo Red
Congo Rubine
Diamine Red B
Delta Purpurine 5B
Hessian Purple N

Oranges: Benzo Fast Orange S
Benzo Orange R
Congo Orange G, R
Orange TA
Pluto Orange G
Toluylene Orange G

Yellows: Benzo Fast Yellow 5GL
Chrysophenine, GS
Thiazole Yellow G, R

Greens: Benzo Dark Green B, GG
Benzo Green BB, G

Blues: Benzo Azurine 3G
Benzo Blue RW
Benzo Cyanine B, R
Blue for Halfwool
Brilliant Benzo Blue 6B
Chicago Blue B
Diazo Blue Black
Diazo Black B, R

Violets: Benzo Bordeaux 6B
Congo Corinth G, B

Browns: Benzo Brown 5R
Benzo Chrome Brown B, BS, G, 5G, R, 3R
Cotton Brown I, II, III
Direct Fast Brown B
Pluto Brown NB

Blacks: Direct Blue Black B, N

Blacks: Direct Deep Black E, E extra G, R, RW, RW extra, EW, EW extra
Black for Half-wool B, BGS, LS
Pluto Black BS extra, 3B extra, G, FR, A extra, CR, F extra, L extra, TG extra

178. **Benzidine colours,** which can be employed in dyeing half-wool, having a **greater affinity to the wool than to the cotton, but which dye both fibres the same or almost the same shade** at the boil in a neutral bath containing Glauber's salt:

Reds: Brilliant Geranine 3B
Brilliant Congo R
Geranine G, BB
Yellows: Chrysamine G, R
Browns: Pluto Brown GG, R
Blacks: Benzo Fast Black
Direct Blue Black 2B

179. **Benzidine colours,** which can be employed in dyeing half-wool, having a **greater affinity to the cotton than to the wool, but which dye both fibres the same or almost the same shade** at the boil in a neutral bath containing Glauber's salt:

Reds: Benzo Fast Scarlet 4BS, GS, 5BS, 8BS
Oranges: Chloramine Orange G
Mikado Orange G
Yellows: Chloramine Yellow GG, M, HW
Curcumine S
Direct Yellow R, R extra
Blues: Benzo Azurine G
Benzo Chrome Black Blue B
Benzo Fast Blue B
Benzo Sky Blue, conc.
Brilliant Azurine B
Diazo Black BHN
Browns: Benzo Brown D 3G extra
Benzo Dark Brown extra
Violets: Benzo Fast Violet R
Benzo Violet R
Heliotrope BB
Blacks: Pluto Black CR, F extra

Directions for dyeing Half-wool in one bath.

A large number of Benzidine colours dye both fibres in half-woollen goods a uniform shade in one bath (see under No. 177). A second and smaller category of Benzidine colours dye the wool more intensely but to the same or almost the same shade as the cotton (see under No. 178) a third group of Benzidine colours dye the cotton more than the wool, but both fibres are dyed the same or almost the same shade (see under No. 179). No hard and fast rules can be drawn in the grouping of colours, as their behaviour to the fibres is not only dependent on the proportion of the wool and cotton woven in the texture but on the quality of the fibres and more especially on the temperature at which they are dyed and the various additions made to the dye bath. It can be laid down as a rule, that when dyed at a high temperature the dyestuff is absorbed more greedily by the wool, whereas at a lower temperature the cotton is dyed fuller. Weak alkalies such as soda, borax &c. have a tendency to diminish the affinity of the wool to the colour, but weak acids, such as acetic acid, have quite the contrary effect. The latter ingredients are not as a rule employed to cause the dyestuff to fall on the wool or cotton fibres, this being almost entirely produced by the regulation of the temperature of the dye liquor.

It is best to dye in wooden vessels with a winch attached, and use indirect steam, so as to avoid the dye liquor becoming diluted, which, particularly in half-wool dyeing might prove very disastrous. Before dyeing, the quality of the goods should be carefully examined. For shoddy, which generally greedily absorbs Benzidine colours, employ such colours, if possible, that dye the cotton fuller than the wool, keeping the temperature of the dye bath under the boil. The same applies to goods severely milled, as they have to be boiled for a long time in order to get the colour to penetrate properly. For thin, loosely woven material and felt for ladies' mantle cloth, which do not stand long boiling, it is more advantageous to employ Benzidine colours that dye the wool and the cotton a uniform shade. Dye in a volume of dye liquor of 20—25 : 1 of goods, and

according to the depth of shade required with the addition of 30—60% Glauber's salt cryst. Bring the bath up to the boil, enter the goods and run for ½ hour in the gently boiling bath. If the wool is then too light or not up to the proper shade, boil gently for a short time, adding if necessary some of the respective dyestuff for shading. Should the cotton, however, not be full enough or the desired shade not be obtained, then turn off steam and run for some time in the cooling down bath, adding if necessary a little Cotton colour. After dyeing, rinse and dry. As the colour is not thoroughly exhausted, especially when dyeing dark shades, it is advisable to use the dye liquor again, replenishing the bath with about ¼—⅕ less colour of the amount originally taken. The quantity of Glauber's salt necessary is correspondingly reduced, according to the quantity of water lost in lifting the goods.

Another method of dyeing is the following: Add the undissolved colour to the dye vat containing boiling water, and when the dyestuff is dissolved, add sufficient cold water to bring the temperature of the bath down to about 140° Faht., enter the goods, work for ½ hour, bring to the boil within ½ hour and then sample. If the cotton is dark enough and the wool too light, add a Wool colour that dyes in a neutral bath, and dye to pattern.

If on the other hand the shade on both fibres is too light, then also add the cotton colour at the same temperature.

189. Wool colours employed for **shading the wool,** in the **dyeing of half-woollen goods, as they exhaust well in a neutral bath:**

Reds: Brilliant Croceine 3B
Cochineal Scarlet PS
Croceine Scarlet 3B, 10B
Fast Red A
Ponceau 3R
Rhodamine B, G

Oranges: Croceine Orange G
Orange GT, IIB

Yellows: Indian Yellow G

Yellows: Metanil Yellow
Naphtole Yellow S
Quinoline Yellow
Greens: Acid Green 3B
Alizarine Green SS
Brilliant Acid Green 6B
Fast Green CR
New Acid Green 3BX, GX
Blues: Alizarine Blue SKY in powder
Alkali Blue 6B and other qualities
(require to be acidulated)
Brilliant Sulphon Azurine R
Brilliant Wool Blue G extra
New Victoria Blue B
Lazuline Blue R
Sulphon Azurine D
Sulphon Cyanine G, GR extra, 5R extra
Sulphon Acid Blue B. R
Wool Blue N extra, R extra, SR extra
Violets: Acid Violet HW, 7B
Alkali Violet LR
Browns: Sulphon Brown R
Blacks: Acid Black 5B, 8B
Diamond Black F, NG
Naphthaline Acid Black 4B
Phenylamine Black 4B, T
Sulphon Blue Black
Sulphon Black R, 4BT
Sulphon Cyanine Black B, 2B
Wool Black N4B

The above colours dye the wool a full shade in a neutral bath, so they are advantageous for dyeing in combination with those Benzidine colours given under Nos. 177—179, thus dyeing both fibres a uniform shade, in case the Benzidine colours have not dyed the wool the proper depth of shade. Prepare the bath in the same way as when dyeing only Benzidine colours, adding 30—60% Glauber's salt crystals together with the requisite quantity of cotton and wool colour. Dye according to method given on page 261 under No. 179.

181. **Benzidine colours** which are adapted for dyeing the **cotton** in half-woollen goods in the **milling** machine containing soap and luke warm water:

Reds: Benzo Fast Red L
Benzo Rhoduline Red B
Brilliant Geranine B
Oranges: Benzo Fast Orange S
Chloramine Orange G
Mikado Orange G
Yellows: Benzo Fast Yellow 5 GL
Direct Yellow R, R extra
Greens: Benzo Dark Green B
Benzo Green BB
Benzo Olive
Brilliant Benzo Green B
Blues: Benzo Azurine G, 3 G, R
Benzo Chrome Black Blue B
Benzo Fast Blue BN
Benzo Indigo Blue B
Benzo Sky Blue, conc.
Diazo Black BHN
Violets: Benzo Violet R
Browns: Benzo Brown D 3 G extra
Benzo Dark Brown
Greys: Benzo Fast Black
Direct Black V T
Blacks: Pluto Black BS extra

182. **Benzidine colours,** which are adapted for the **printing** of **half-woollen goods:**

Reds: Benzo Fast Scarlet 4 BS, GS
Benzo Purpurine 1 B, 4 B, 6 B, 10 B
Benzo Fast Red L, GL
Benzo Red S G
Brilliant Congo R
Brilliant Geranine B, 3 B
Brilliant Purpurine R
Delta Purpurine 5 B
Diamine Red B
Geranine BB, G
Rose Azurine B, G
Oranges: Benzo Orange R
Congo Orange G, R
Yellows: Chrysophenine G

Yellows: Chloramine Yellow G G, M
Chrysamine G, R
Thiazole Yellow G, R
Greens: Benzo Dark Green B, G G
Benzo Green G
Blues: Benzo Sky Blue
Brilliant Benzo Blue 6B
Violets: Benzo Bordeaux 6B
Benzo Fast Violet R
Benzo Violet R, R L extra
Congo Corinth B, G
Heliotrope BB
Browns: Cotton Brown IV
Blacks: Benzo Fast Black
Direct Deep Black G

Recipe for Printing.

The well cleaned or bleached half-woollen material can be printed without any previous treatment. Occasionally the material is chlorinated or prepared with stannate of soda before printing, in order to facilitate the affinity of the Benzidine colours to the wool. If the half-woollen material is not chlorinated, the white remains purer than the chlorinated wool, which has a yellowish tint. British gum is employed as a thickening agent in the print paste for Benzidine colours, occasionally an addition of borax, phosphate of soda, etc. is made.

Steam for 1 hour without pressure, wash, soap cold for several mins., wash well and dry.

General Recipe for Printing.

Boil:

2	oz.	or 20	grms.	**Benzidine colour**
30	»	» 300	»	British gum and
3 1/4	pints	» 660	»	water, add
2	oz.	» 20	»	borax or phosphate of soda
		1000	grms.	

183. **Benzidine colours,** adapted for **dyeing half-wool,** which are **dischargeable** with **tin crystals:**
Reds: Benzo Purpurine 4B, 10B
Brilliant Geranine B, 3B
Congo Rubine

Reds: Geranine G
Delta Purpurine 5B
Diamine Red B
Oranges: Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Pluto Orange G
Yellows: Chrysophenine G
Greens: Benzo Dark Green B, GG
Benzo Green G
Blues: Benzo Blue RW
Benzo Chrome Black Blue B
Benzo Cyanine B
Benzo Sky Blue, conc.
Brilliant Azurine B
Brilliant Benzo Blue 6B
Chicago Blue B
Diazo Black BHN, B, R
Violets: Benzo Fast Violet R
Benzo Violet R
Congo Corinth G
Browns: Benzo Chrome Brown B, G, R, 3R, BS
Cotton Brown I
Direct Fast Brown B
Pluto Brown R
Blacks: Benzo Fast Black
Black for Halfwool LS (reddish cream)
Direct Blue Black B, 2B, N
Direct Black VT
Direct Deep Black E, E extra, G, R, RW, RW extra
Pluto Black BS extra, G, FR

Recipe for White Discharges.

Dye the half-woollen pieces with Benzidine colours according to the recipe given under No. 179, page 261. After the pieces have been washed well and dried, discharge with tin crystals (or stannous sulphocyanide). A pure white is scarcely ever obtainable, so it is therefore advisable to colour discharge.

General Recipe for White Discharges.

Boil:

12 oz.	or	120 grms.	wheat starch		
$^{7}/_{8}$ pint	»	187	»	gum solution 1 : 1 and	
$1^{3}/_{4}$—$1^{7}/_{8}$ pints	»	353—333	»	water, then add,	
$1^{1}/_{4}$ »	»	250	»	acetate of tin 32° Tw.	
5—7 oz.	»	50— 70	»	tin crystals	
4 »	»	40	»	citric acid powder	
		1000 grms.			

Steam for 5—10 minutes without pressure, wash if necessary and dry.

183a. **Benzidine colours** which when **dyed on half-wool** are **dischargeable** with **Hydrosulphite NF.**

Reds: Benzo Fast Red (readily enough) GL (readily enough)
Benzo Fast Scarlet 4 BS, 5 BS, 8 BS and GS (readily enough)
Benzo Rhoduline Red B (fairly easily)
Brilliant Geranine B (readily enough)
Congo Red (readily enough)
Congo Rubine (fairly easily)
Geranine G (fairly easily)

Oranges: Benzo Fast Orange S (easily)
Benzo Orange R (readily enough)

Yellows: Chrysamine G and R (easily)
Chrysophenine G (easily)

Greens: Benzo Dark Green G G (fairly easily), B (fairly easily) (yellowish)
Benzo Green B B and G (fairly easily), C (easily)

Blues: Benzo Azurine 3 G (easily), G (fairly easily)
Benzo Blue R W (fairly easily)
Benzo Chrome Black Blue B (easily)
Benzo Fast Blue B (easily)
Benzo Sky Blue (fairly easily)
Brilliant Benzo Blue 6 B (fairly easily)

Violets: Benzo Bordeaux 6 B (readily enough)
Benzo Violet R (readily enough)

Browns: Benzo Brown D 3 G extra (fairly easily)
Benzo Chrome Brown R (fairly easily), B (readily enough)
Direct Fast Brown B (fairly easily)

Browns: Pluto Brown R (easily)
Blacks: Benzo Fast Black (easily)
Direct Blue Black 2 B (fairly easily)
Direct Deep Black E (fairly easily) (yellowish), EW (fairly easily) (yellowish), G (readily enough) (reddish crème), R W (fairly easily) (yellowish)
Black for half wool B G S (easily), L S (fairly easily)
Pluto Black B S extra (easily), F extra (fairly easily) (yellowish)

184. Colours employed in the **dyeing of half-wool** for **shading the wool,** which are **dischargeable with tin crystals:**

Reds: Brilliant Croceine 3 B
Cochineal Scarlet P S
Croceine Scarlet 3 B, 10 B
Fast Red A
Ponceau 3 R
Oranges: Croceine Orange G
Orange G T, II B
Yellows: Indian Yellow G (moderately well)
Greens: Alizarine Green S S
Blues: Brilliant Sulphon Azurine R
Sulphon Azurine D
Sulphon Cyanine G, G R extra, 5 R extra
Browns: Sulphon Brown R
Blacks: Acid Black 5 B, 8 B
Diamond Black F, N G
Naphthaline Acid Black 4 B
Phenylamine Black 4 B, T
Sulphon Blue Black
Sulphon Black R, 4 B T
Wool Black N 4 B

Discharge process same as stated under No. 183.

184a. **Shading colours,** for **half-wool** material, which when dyed in a neutral bath exhaust well and are dischargeable with **Hydrosulphite N F.**

Reds: Brilliant Croceine 3 B
Cochineal Scarlet P S
Croceine Scarlet 3 B, 10 B
Fast Red A

Reds: Ponceau 3 R
Oranges: Croceine Orange G
Orange GT, IIB
Yellows: Indian Yellow G
Metanile Yellow
Greens: *Acid Green 3 B
Alizarine Green SS
*Brilliant Acid Green 6 B
*Fast Green CR
*New Acid Green 3 BX, GX
Blues: Alkali Blue 6B and other brands
Brilliant Sulphone Azurine R (yellow)
*New Victoria Blue B
Sulphone Azurine D
Sulphone Cyanine G, GR extra and 5 R (yellow)
Sulphone Acid Blue B and R (yellow)
*Wool Blue N extra
Violets: *Acid Violet HW and 7 B (readily enough)
*Alkali Violet LR (moderately well)
Blacks: Acid Black 5 B and 8 B (middling)
Diamond Black F, NG
Phenylamine Black 4 B and T (middling)

185. The following colours are adapted together with **tin crystals for colour discharging half-woollen goods dyed with Benzidine colours:**

Reds: Rhodamine G, G extra (Tannic acid)
Saffranine FF extra (Tannic acid)
Yellows: Auramine concentrated, O, I, II, (Tannic acid)
Greens: Brilliant Green Cryst. (Tannic acid)
Blues: Galiamine Blue in paste (Chrome)
Violets: Methyl Violet 2 B, 4 B, 6 B (Tannic acid)
Rhoduline Heliotrope B (Tannic acid)
Rhoduline Violet (Tannic acid)

* The discharges on some Triphenylmethan dyestuffs, namely those marked with an asterisk, sometimes become coloured again when exposed to the action of the atmosphere, so it is advisable to employ them for colour discharges.

Recipes for Colour Discharges.

Colour Discharge I.

Boil:

3	oz.	or 30	grms.	**Basic Colour**
7	»	» 70	»	wheat starch
1/2	pint	» 100	»	acetic acid 9° Tw. (30%)
1 3/5	noggs.	» 80	»	water and
2 4/5	»	» 140	»	gum solution 1 : 1, add
1 1/4	pint	» 250	»	acetate of tin 32° Tw.
16	oz.	» 160	»	tin crystals
3/4	pint	» 150	»	acetic acid tannic acid solution 1 : 1
2	oz.	» 20	»	citric acid powder

1000 grms.

Colour Discharge II.

Dissolve:

3	oz.	or 30	grms.	**Basic Colour** in
1/2	pint	» 108	»	water and
4/5	nogg.	» 40	»	acetic acid 9° Tw. (30%)
1 1/3	pints	» 272	»	acetic acid starch tragacanth thickening (A)
24	oz.	» 240	»	tin crystals
2 4/5	noggs.	» 138	»	ammonium sulphocyanide
3 1/2	oz.	» 34	»	citric acid powder
2 4/5	noggs.	» 138	»	acetic acid tannic acid solution 1 : 1

1000 grms.

Print the colour discharge on the cloth dyed with Benzidine colours, steam for 1/2 hour without pressure, run through a cold tartar emetic bath (1 3/5 oz. per gallon water), wash and dry.

186. **Basic colours,** which are adapted for the **printing** of **half-wool** with **tannic acid:**

Reds: Brilliant Rhoduline Red B in powder, BD in paste
Rhodamine B, G, 5 G
Rhoduline Red B, G in powder, GD in paste
Saffranine FF extra

Oranges: Coriphosphine O, OX, OX extra

Yellows: Auracine G
Auramine concentrated, O, I, II

Greens: Brilliant Green Cryst.
Methyl Green B
Blues: Blue 8336 (Navy Blue)
Methylene Blue BB
New Victoria Blue B
Rhoduline Blue R, GG extra
Rhoduline Sky Blue
Turquoise Blue BB, G
Victoria Blue B
Violets: Brilliant Rhoduline Purple R
Methyl Violet 5R—7B
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Browns: Bismarck Brown F, M
Greys: New Fast Grey
Blacks: Jute Coal Black S
Jute Black B

General Recipe for Printing.

Boil:

2 oz.	or 20 grms.	**Basic Colour**	
3 1/5 noggs.	» 160 »	acetic acid 9° Tw. (30%)	
2 pints	» 400 »	water and	
1 1/2 »	» 300 »	British gum, when cooled down add	
2 2/5 noggs.	» 120 »	acetic acid tannic acid solution 1 : 1	
	1000 grms.		

Print on clorinated or unchlorinated half-woollen cloth (Recipe see page 169 under No. 105) (which has if necessary been prepared with stannate of soda 3° Tw. and run through sulphuric acid 4° Tw., washed and dried), steam for 1 hour without pressure, run through a bath of tartar emetic (1 4/5 oz. per gallon water) wash, soap slightly for about 5 mins. at 85° Faht., wash and dry.

187. **Mordant colours,** which are adapted for the **printing** of **half-wool:**

Reds: Alizarine Red SX extra in paste and other brands (alumina)
Brilliant Chrome Red in paste (Chrome)
Oranges: Alizarine Orange G, GG and R in paste (alumina)

Yellows: Chrome Yellow in paste, D, G in powder (Chrome)

Greens: Alizarine Green V and DG in paste (Chrome)
Alizarine Green S and SW in paste (Chrome)
Chrome Green in powder (Chrome)

Blues: Alizarine Blue S, SR, S extra, SR extra and SW in paste and in powder (Chrome)
Alizarine Blue BAG in paste (Chrome)
Alizarine Blue SAP in paste (alumina)
Celestine Blue B (Chrome)
Gallamine Blue in paste (Chrome)

Violets: Alizarine Blue HR in paste (Chrome)
Alizarine Blue HR in paste (alumina)

Browns: Alizarine Orange G, GG and R in paste (Chrome)

Greys: Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder (Chrome)

Blacks: Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste and in powder (Chrome)

General Recipe for Printing (with Chrome).

Boil:

15	oz.	or 150 grms.		**Mordant Colour in paste**
1 1/2	pints	» 300	»	British gum
1/2	»	» 100	»	acetic acid 9° Tw. (30%) and
1 2/5	»	» 280	»	water, add
1	oz.	» 10	»	oxalic acid dissolved in
1/2	pint	» 100	»	water, then add
1 1/5	noggs.	» 60	»	acetate of chrome 32° Tw.
		1000 grms.		

General Directions for Printing (with alumina).

Mix:

15	oz.	or 150 grms.		**Mordant Colour paste**
2 3/5	pints	» 530	»	acetic acid starch tragacanth thickening (R)
1	pint	» 200	»	acetate of alumina 18° Tw.
1	nogg.	» 50	»	acetic acid 9° Tw. (30%)
1	»	» 50	»	acetate of lime 23° Tw.
2	oz.	» 20	»	oxalic acid powder
		1000 grms.		

Print on chlored or unchlored half-woollen cloth, (recipe see page 169 under No. 105) steam for 1 hour without pressure, chalk, wash, soap cold for about 5 minutes, wash and dry.

188. **Benzidine colours**, which are adapted for **dyeing half-woollen skirt protectors** (if necessary with a small addition of *Basic, **Acid, or ***Sulphon colour for the purpose of brigtening the shade:

Reds: Benzo Purpurine 4B
Brilliant Geranine B, 3B
Congo Rubine
Geranine B, G
*Rhodamine B, G

Oranges: Benzo Orange R
Chloramine Orange G
Congo Orange G, R
**Orange IIB
Pluto Orange G

Yellows: Chloramine Yellow GG, M
Chrysophenine G
Direct Yellow R
**Indian Yellow G
Thiazole Yellow G

Greens: Benzo Dark Green B, GG
Benzo Green B, G
**Brilliant Acid Green 6B
***Fast Green CR

Blues: Benzo Azurine G
Benzo Blue RW
Benzo Cyanine 3B
Benzo Fast Blue B
Benzo Sky Blue, conc.

Blues: Brilliant Azurine B, 5R
Brilliant Benzo Blue 6B
Diazo Black BHN
*New Victoria Blue B
***Sulphon Cyanine G, GR extra
*Turquoise Blue G
*Victoria Blue B
**Wool Blue N extra, R extra

Violets: **Acid Violet HW
**Alkali Violet LR
Benzo Fast Violet R
Benzo Violet R
*Methyl Violet 5B

Browns: Benzo Chrome Brown B, BS, G, 5G, R, 3R
Pluto Brown R

Greys: Benzo Fast Black
Direct Blue Black B, N
Direct Deep Black E, E extra, RW, RW extra

Blacks: **Acid Black 5B
Black for Halfwool B, BGS
Diazo Fast Black SD
Direct Deep Black E, E extra, RW, RW extra, EW extra
Pluto Black BS extra, G, A extra, F extra, L extra

Recipe for Dyeing Half-woollen goods in one bath.

After the goods have been singed and beamed on the steam cylinder and steamed for 1/4 hour, whereby the singed particles are removed, boil for 5—6 hours in water. Afterwards measure off to the required length and wash at 120° Faht. with soap and soda (about 5 lbs. soda and 2 1/2 lbs. soap per 100 lbs. goods), rinse and then dye.

Dye in the same way as other half-woollen goods (Recipe see pages 261—262 under No. 179). In dyeing half-woollen skirt protectors it is advisable to employ colours that dye wool and cotton a uniform shade, as both fibres being visible on the surface any divergence in shade on the different fibres is easily perceptible. For dark shades boil up the bath well containing the colour and 50% Glauber's salt crystals and then enter the goods. Matching off and shading are done exactly

in the same way as when dyeing other half-woollen goods. When dyeing skirt protectors with velveteen pile it is absolutely necessary to dye the wool first slightly lighter, as the cotton colour also fills up the wool when the goods are allowed to run, and particularly with this class of goods the wool is darkened if the above precaution is not taken.

The best method for the dyeing of light shades is the following: Fill the vat only half full of water, add only 20—25% Glauber's salt crystals together with the requisite quantity of colour and boil up for 1—2 mins., then turn off steam. Make up with cold water, enter the goods, work at this temperature for ¼ hour, and bring the bath to the boil within ¼ hour; after boiling for ½ hour, working well during this time, match off and proceed in the usual manner.

When dyeing light cream or silver shades it is better not to boil at all, as the shades are easily liable to turn dull. Work at a temperature of 160—175° Faht. Shades of remarkable clearness of tone can be obtained by stoving after dyeing, and the following colours are adapted for this purpose: Rhodamine B, Brilliant Geranine B, Brilliant Benzo Blue 6B, New Victoria Blue B, Alkali Violet LR, Indian Yellow G, Brilliant Azurine B, Thiazole Yellow G, Benzo Violet R, Benzo Sky Blue, Turquoise Blue G, Chrysophenine, etc.

Rinse well after the goods are dyed, then dry, and finish. The latter process is carried out by running the braid through a steam box and afterwards between a pair of ordinary squeezing rollers.

Benzidine colours, which have the advantage of being very fast to alkalies, are especially adapted for the dyeing of half-woollen skirt protectors, as fastness to street dirt is of main importance for this class of articles.

189. **Benzidine colours,** which are adapted for **dyeing cotton cold** in **half-woollen goods** in which the **wool** has been **previously dyed with acid colours** (the wool being but slightly tinged):

Reds: Benzo Fast Scarlet 4BS
Benzo Purpurine 10B
Brilliant Geranine B, 3B
Brilliant Purpurine R
Congo Red

Oranges: Chloramine Orange G
Mikado Orange G
Yellows: Chloramine Yellow GG, M
Direct Yellow R, R extra
Thiazole Yellow R
Greens: Benzo Dark Green B
Blues: Benzo Blue 2B, 3B, RW
Benzo Chrome Black Blue B
Benzo Cyanine 3B
Benzo Sky Blue, 4B, conc.
Brilliant Azurine B
Brilliant Benzo Blue 6B
Diazo Black B, BHN
Diazo Blue Black
Violets: Benzo Violet R
Heliotrope BB
Browns: Benzo Chrome Brown B, G, R, 3R
Blacks: Direct Black VT
Direct Deep Black E, E extra
Pluto Black BS extra, G, FR, F extra

Directions for Dyeing.

Dye the wool first with Acid colours for 1 hour at the boil with the addition of 10—15% bisulphate of soda or 4—6% sulphuric acid and 10—15% Glauber's salt crystals. Afterwards rinse in water containing a little soda so as to remove the acid more quickly. In order that the wool is not dyed any more employ such Benzidine colours that dye the cotton only in a cold or at the most luke warm bath. This latter process is carried out either in the ordinary dye vat for piece goods (for dark shades) and light shades are dyed best in the jig. The volume of dye liquor should not be more than 20 : 1 of goods. Dye for ¾—1 hour at 65—85° Faht. with the addition of 30% Glauber's salt crystals. Rinse in cold water, acidulated with a little acetic acid to neutralise the alkali, whereby the shades are generally rendered clearer in tone.

190. The following **Acid and slightly Acid dyeing Wool** and **Sulphone colours** when **dyed** on **half-woollen goods** stand **mercerisation** (passage through soda lye):

Reds: Croceine Scarlet 10B
Fast Red A

Reds: Rodamine B, G
Oranges: Croceine Orange G
Orange G T
Yellows: Indian Yellow G
Greens: Acid Green 3 B
Alizarine Green S S
Brilliant Acid Green 6 B
Fast Green C R
New Acid Green 3 B X, G X
Blues: Alkali Blue 2 R, 3 R, 4 R 6 R extra
Brilliant Sulphon Azurine R
Lazuline Blue R
New Victoria Blue B
Sulphon Azurine D
Sulphon Cyanine G, G R extra, 5 R extra
Sulphon Acid Blue B, R (good), G (fairly good)
Wool Blue N extra, R extra
Violets: Acid Violet H W
Alkali Violet L R
Blacks: Acid Black 5 B, 8 B
Diamond Black N G, F
Naphthaline Acid Black 4 B
Phenylamine Black 4 B, T
Sulphon Black 4 B T, R
Sulphon Blue Black
Wool Black N 4 B

191. The following **Benzidine colours** stand **mercerisation** when **dyed** on **half-woollen goods** (passage through soda lye):

Reds: Benzo Fast Scarlet 4 B S, G S
Benzo Purpurine 4 B, 10 B
Benzo Rhoduline Red B
Brilliant Geranine B, 3 B
Brilliant Purpurine R
Congo Red
Delta Purpurine 5 B
Reds: Diamine Red B
Geranine G
Oranges: Chloramine Orange G
Mikado Orange G
Yellows: Chloramine Yellow M

Yellows: Chrysophenine, GS
Direct Yellow R, R extra
Thiazole Yellow G, R
Blues: Benzo Chrome Black Blue B
Benzo Cyanine B, R
Benzo Fast Blue B
Benzo Sky Blue, conc.
Brilliant Benzo Blue 6B
Violets: Benzo Bordeaux 6B
Benzo Fast Violet R
Congo Corinth G
Browns: Benzo Chrome Brown B, R, G
Cotton Brown I, II, III
Blacks: Direct Blue Black B
Direct Deep Black E, E extra
Pluto Black BS extra

Method of mercerising Half-woollen goods.

For mercerising, 3 boxes are employed, the first one of iron in a wooden casing with sufficient space between for ice to keep the caustic soda 32—40° Tw. at 38—40° Faht. in the iron vessel, so that the wool is not affected. The pieces have to be squeezed out thoroughly before entering the second box, containing water acidulated with hydrochloric acid, and care be taken that sufficient acid is always present to neutralise any caustic soda still contained in the goods. From practical experience it has been ascertained, that if the pieces are acidulated immediately they are treated with caustic soda the brightness of the crepon effect is considerably improved. The third box contains clean water for rinsing purposes. Finally the goods are rinsed in running water for 20 mins. in a hank washing maschine.

192. **Acid and slightly acid dyeing Wool colours,** which do not stand **mercerisation** when **dyed** on **half-woollen goods:**

Reds: Brilliant Croceine 3B
Cochineal Scarlet PS
Croceine Scarlet 3B
Ponceau 2R
Oranges: Orange IIB
Blues: Alkali Blue 1B—6B, R
Browns: Sulphon Brown R

Silk.

193. The following **acid** and **slightly acid dyeing colours** are adapted for the **dyeing of silk.** (Dyeing is usually done in a boiled off soap bath broken with sulphuric acid. Those colours marked with an asterisk are dyed in a boiled off soap bath broken with acetic acid, whereas those marked with a dagger are dyed in a soap bath):

Reds: Acid Magenta
Azo Bordeaux
Azo Crimson L, S
Azo Eosine
Azo Fuchsine B, G, S, 6B
Azo Phloxine 2G
*Bordeaux extra
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R, 5R
Carmoisine B
*Cloth Red 3B extra, B, G, G extra, 3G extra
Cochineal Scarlet PS
Croceine Scarlet 10B, 9B, 7B, 5B, 5BN, 3B, 2B, 1B, R, 2BX, 3BX
Double Ponceau 1R—4R
Fast Acid Magenta B
Fast Red A, BT, E, NS
*Eosine S extra bluish
Imperial Scarlet 3B, 1B
Metanil Red 3B, 3B extra
Orange R
Orseilline BB
Ponceau 1R, 2R, 2RL, 3R
Rhodamine B, G, B extra, G extra

Oranges: Croceine Orange G, R
*Eosine S extra yellowish, I yellowish
Fast Light Orange G
Golden Orange
Mandarine G
Orange IIB, GT, RO

Yellows: Fast Light Yellow G, 3G
Indian Yellow G, R
Naphtole Yellow S
Naphtylamine Yellow
New Yellow, extra concen.

Yellows: Quinoline Yellow
Tartrazine

Greens: Acid Green BB extra, 6B, BBN extra, liquid quintuple, G extra, GG extra, GB extra
Alizarine Green CE and CG extra in paste and in powder
Brilliant Acid Green 6B
Fast Green CR, W, bluish, extra, extra bluish
Fast Light Green in powder and liquid quintuple
New Acid Green 3BX, GX
Wool Green BS

Blues: Alizarine Blue SAP in powder
Alizarine Blue SKY powder
Alizarine Blue BR3G
†Alkali Blue 7B, 6B, 5B, 4B, 3B, 2B, 1B, 4R, 6R extra
Azo Acid Blue 4B, 6B
Brilliant Blue extra greenish
Brilliant Wool Blue B extra, G extra
Cotton Blue VI—RR
Carmine Blue B, G
Fast Blue greenish
Fast Acid Blue B, B extra
Induline B
Intensive Blue
New Patent Blue B, 4B, GA
Night Blue extra greenish, 103
Red Blue extra concen. 119
Silk Blue BES, BSP, 12120, 10871
Soluble Blue greenish I, reddish I
Sulphon Acid Blue B, R, G
Wool Blue N extra, R extra, SR extra

Violets: Alizarine Blue JR in paste and in powder
Alkali Violet R, LR
Azo Acid Violet R extra, 4R, B extra
Fast Acid Violet 10B
Acid Violet 4B extra, 3B extra, 8B extra, R extra in powder, 6BN, 4RS, 4R, 4BG extra, 5B, 7B, 5B liquid, HW, BW

Greys: Nigrosine B, G

Blacks: Naphthaline Acid Black 4B, 21455
Phenylamine Black 4B, T

Blacks: Victoria Black B, G, 5G
Victoria Black Blue
Wool Black N4B

Directions for Dyeing.

A) Preparing of the Silk.

Silk must be treated in different ways before dyeing according to the condition in which it has to be dyed, such as raw silk, souple silk, or boiled off silk, and much depends upon the colour to be dyed or the extent of the weighting required.

Raw silk is treated in a luke warm bath with 6—8 % soda calculated on the weight of the goods. After turning the silk several times it swells up considerably, and when the sericine is dissolved off the silk becomes soft and glossy. This treatment has to be carried out as quickly as possible, and the temperature of the liquor should not get above 95° Faht., otherwise the silk becomes affected and loses too much of its natural gum. Afterwards rinse well and finally hydro-extract.

To produce souple silk a special treatment has to be resorted to, whereby the silk loses 5—10 % of its weight and acquires almost the same properties as boiled-off silk. After the silk has been softened and cleaned in a weak soda solution as described above, treat at 130—185 Faht. in a bath containing 6¼ oz. tartar,* 1½ oz. sulphuric acid 166° Tw. and 1⅛ pint aqueous sulphurous acid per 10 lbs. silk in order to soften the silk which has become hard and brittle by the previous treatment. Finally acidulate or rinse first in warm then in cold water. Silk can also be soupled by treating it for 1—2 hours at 75—85° Faht. in a 10 % soap solution.

Yellow raw silk is bleached with aqua regia 4½° Tw. and then stoved before it is soupled, whereas white raw silk merely requires stoving. (Instead of the bleaching process the yellow tone of the silk can be corrected by treating with Methyl Violet or some similar colour.

When treating with aqua regia (1 part nitric acid and 5 parts hydrochloric acid) as soon as the silk assumes a greenish grey colour it is taken out and

* Remark: Lately silk is also treated for 1 hour at 195—212° Faht. with Glauber's salt and sulphuric acid, i. e. with 10 % bisulphate of soda.

washed well in water, whereby the greenish tone disappears, whereas should the silk have a yellow tone (which is a sign that it has been treated too long in the aqua regia) it is not possible to remove same.*

Bleaching with sulphurous acid in stoving chambers, employing 5 lbs. sulphur per 100 lbs. of goods, is done after treating in a luke warm soap bath. After stoving rinse in luke warm water, and if necessary soap again slightly.

Ungummed silk is obtained by treating in a gently boiling soap solution. Occasionally the silk is subjected to this treatment a second time, in which case only half the amount of soap employed for the first bath is taken. For the first bath 30—35% soap of the weight of the goods are used, and the silk is turned for 30—40 mins., in which time the sericine is removed from the silk. In order to strip the sericine thoroughly from the silk it is necessary to treat further for 1 hour at 195° Faht., and this bath is then what is called the »boiled-off soap bath«.

If the silk is intended for pure white or light shades the material has to be soaped again for 1—2—3 hours in a fresh bath containing 15—17% soap, the duration of boiling being dependant upon the quality of the silk. If the silk is then not white enough it is put into linen bags and boiled in the soap liquor until the desired white is obtained. The object of employing linen bags is to prevent the silk becoming entangled. The loss of weight in boiling off varies from 17% (white grège, Japanese) to 27% (yellow organzine, Chinese).

For boiling off only fine, pure, neutral soap should be employed; it is best to use a good quality of olive oil soap. Care should also be taken that the water is as free from lime as possible. The boiled off silk must be washed well and then hydroextracted, when it is ready to be dyed.

Remark: Silk can also be bleached with peroxide of hydrogene. Prepare the bath for 10 lbs. of silk

* Remark: Silk is bleached lately with nitrous acid i. e. by working cold in a bath containing 5% sulphuric acid and 1½% nitrite of soda. The silk must be rinsed well and quickly after this treatment, otherwise it becomes flecky.

with 12 gallons water, 2 1/2 gallons of a solution of peroxide of hydrogene, 19 1/4 oz. silicate of soda and 19 1/4 oz. of soap dissolved in water. Immerse the silk completely in this liquor, warm up the bath to about 120° Faht. and bleach for 1 hour, working the goods occasionally. Finally acidulate in a fresh bath containing some sulphuric acid and afterwards rinse well.

Peroxide of soda can also be employed instead of peroxide of hydrogene. Prepare the bath by adding carefully under constant stirring 10 lbs. sulphuric acid 166° Tw. to 150 gallons water, and when cooled down add slowly and in small portions 7 1/2 lbs. peroxide of soda, then 5 lbs. of silicate of soda, and if necessary 5—10 lbs. white soap dissolved in water (for 100 lbs. silk). Bleach in a similar manner to that described above for peroxide of hydrogene, warming up the bath, however, to about 175° Faht.

B) Directions for Dyeing Silk.

a) with Acid Colours.

Acid colours are dyed in a boiled off soap bath. The quantity of boiled off soap liquor should be about 1/5th—3/4th the amount of liquor in the bath. The boiled off soap is poured into the vat and diluted sulphuric acid is added until the bath ceases frothing. As a rule take for light shades 2% and for dark shades 5% sulphuric acid. Warm up the bath until it is luke warm, work the silk in it for some time, lift the goods, add the requisite quantity of filtered colour solution, stir up well and enter the silk again, then warm up to 195° Faht. After 1 hour, rinse in cold water, then scroop with 10% acetic acid or 5% sulphuric acid.

Remark: A good substitute for boiled off soap is the following mixture: For 5 gallons water mix up 1 3/4 lbs. olive oil soap and 6 1/2 oz. pure white glue (Gelatine), each dissolved separately in water, and to this add 8 oz. olive oil and 1 oz. caustic soda.

Another substitute for boiled off soap can be obtained by boiling up 8 oz. olive oil soap and 1 3/4 oz. gelatine in 2 gallons water.

Calcareous water should possibly be avoided, or the soap solution or the water itself should be acidulated before mixing the two.

b) with slightly acid dyeing colours.

Such colours are dyed for 1 hour at a temperature up to 195° Fahr. with the addition of boiled off soap liquor and, according to the depth of shade required, 2—5% acetic acid. Litmus paper must distinctly show the acid reaction. 5—10% acetate of ammonia can be employed instead of boiled off soap liquor and acetic acid.

For scrooping, take 4 oz. acetic acid or 2 oz. tartaric acid crystals per 5 gallons water.

Remark: By after-treating the dyed shades with tannins such as tannic acid, sumach or gall-nuts they become faster to washing; the same effect can be obtained by after-treating with acetate of alumina 4½—6° Tw. (or acetate of chrome), by which process, however, the silk assumes a softer handle.

194. **Acid colours,** which **dye level** on **silk** (without the use of boiled off soap):

Reds: Acid Magenta
Azo Crimson L, S
Azo Fuchsine B, G, S, 6B
Azo Phloxine 2G
Brilliant Croceine 3B
Carmoisine B
Croceine Scarlet 10B, 9B, 7B, 5B, 5BN, 3B, 2B, 1B, R
Fast Red NS

Oranges: Croceine Orange G, R
Fast Light Orange G
Golden Orange
Mandarine G
Orange IIB, GT, RO

Yellows: Indian Yellow G
Naphtole Yellow S
Quinoline Yellow

Greees: Acid Green BB extra, 6B, BBN extra, liquid quintuple, G extra, GG extra, GB extra
Brilliant Acid Green 6B
Fast Green bluish, extra, extra bluish
Fast Light Green, liquid quintuple
New Acid Green 3BX, GX

Blues: Alizarine Blue SAP in powder

Blues: †Alkali Blue 7B—6R extra
Brilliant Wool Blue G extra
Fast Acid Blue B, B extra
Intensive Blue
New Patent Blue B, 4B, GA
*New Victoria Blue B
*Victoria Blue B
Wool Blue N extra, R extra

Violets: Azo Acid Violet B extra, R extra, 4R
Fast Acid Violet 10B
Acid Violet 5B, 4B extra, 8B extra, 4RS

Greys: Nigrosine B, G

Blacks: Naphthaline Acid Black 4B, 21455
Victoria Black B, G, 5G

Directions for Dyeing.

Prepare the dye bath with about 20% Glauber's salt cryst. and 3% sulphuric acid, add the well dissolved and filtered colour, and warm up very slowly to 195° Faht. The goods are dyed in 1 hour, afterwards rinse in cold water then scroop with 10% acetic acid or 5% sulphuric acid. (This recipe is best adapted for waste silk).

195. **Acid** and **weakly acid dyeing colours,** which are adapted for the **printing of silk:**

Reds: Azo Bordeaux
Azo Crimson S
Azo Fuchsine G
Azo Phloxine 2G
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 5R
Carmoisine B
Cochineal Scarlet PS
Croceine Scarlet 2BX, 3BX
Double Ponceau 1R—4R
Fast Acid Magenta B
Fast Red NS
Eosine S extra bluish
Imperial Scarlet 3B
Metanil Red 3B, 3B extra
Ponceau 2RL

† Should be dyed in a soap bath, and then scrooped with acid.
* Are dyed best with Glauber's salt and acetic acid.

Reds: Rhodamine B, G, 4G, B extra, G extra
Oranges: Fast Light Orange G
Eosine S extra yellowish
Orange IIB, RO
Yellows: Fast Light Yellow G
Fast Yellow extra
Naphtole Yellow S
New Yellow extra
Quinoline Yellow
Tartrazine
Greens: Acid Green GB extra, GG extra
Alizarine Green CE and CG extra in paste and in powder
Alkali Fast Green B, G
Brilliant Acid Green 6B
Fast Green bluish, CR
Wool Green BS
Blues: Alizarine Blue BRG, BR3G
Alkali Blue 7B—6R extra
Blue for Printing 20658
Brilliant Wool Blue G extra
Fast Blue greenish
Fast Acid Blue B, B extra
Induline B
Intensive Blue
New Patent Blue B, 4B, GA
New Victoria Blue B
Silk Blue BES
Sulphon Acid Blue B, R
Victoria Blue B
Wool Blue N extra, SR extra
Violets: Acid Violet 4B extra, 5B, 7B, BW, R extra, 3R
Alizarine Blue JR paste
Alkali Violet R
Azo Acid Violet 4R, B extra, R extra
Fast Acid Violet 10B
Browns: Alizarine Red Brown
Blacks: Black for Wool Printing 21038

Directions for Printing.

Acid colours are printed on silk in the same way as on wool. Gum water, British gum, mucilage of

tragacanth, etc. are employed as thickening agents. As a rule the silk is not previously prepared in any way. The colour is dissolved in water with the aid of acetic acid, tartaric acid, etc. Colours which are not easily soluble must be boiled up with the thickening agents.

Remark: When using rather thin printing pastes, whereby there is danger of the colour running, it is advisable to previously treat the silk with acetate of alumina $1\frac{1}{2}-3°$ Tw.

General Recipe for Printing.

I. Cloth.

Dissolve:

1—2 oz.	or	10— 20 grms.	**Acid Colour** in
$1\frac{3}{8}$ pint	»	270—260 »	water, thicken with
$3\frac{1}{4}$ »	»	650 »	gum solution 1 : 1, and then add
$1\frac{2}{5}$ noggs.	»	70 »	acetic acid 9° Tw. (30%)
		1000 grms.	

II. Yarn.

Dissolve:

2 oz.	or	20 grms.	**Acid Colour** in
$3\frac{1}{4}-\frac{3}{4}$ pints	»	660—160 »	water, thicken with
$1\frac{1}{4}-3\frac{3}{4}$ »	»	250—750 »	mucilage of tragacanth 65 : 1000, and add
$1\frac{2}{5}$ noggs.	»	70 »	acetic acid 9° Tw. (30%)
		1000 grms.	

Steam the printed silk for 1 hour without pressure, wash well and dry quickly.

196. **Acid** and **slightly acid dyeing colours,** which when **dyed** or **printed** on **silk** are **fast to alkali** (resisting **20% ammonia**):

Reds: Azo Bordeaux
Azo Crimson S
Azo Fuchsine S, 6B
Bordeaux extra
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R, 5R
Cochineal Scarlet PS
Croceine Scarlet 1B—10B, 3BX, R

Reds: Double Ponceau 1R—4R
Fast Red A, BT, E, NS
Eosine bluish
Cloth Red B, 3B extra, G extra, 3G extra
Imperial Scarlet 3B
Metanil Red 3B, 3B extra
Orange R
Ponceau 1R, 2R, 2RL, 3R
Rhodamine B, G, 4G, B extra, G extra
Silk Scarlet G

Oranges: Croceine Orange G, R
Eosine yellowish
Golden Orange
Orange IIB, GT

Yellows: Fast Light Yellow G, 3G
Fast Yellow extra
Indian Yellow G, R
Naphtole Yellow S
New Yellow, extra concen.
Quinoline Yellow

Greens: Alizarine Green CE and CG extra in paste and in powder
Fast Green bluish, extra, extra bluish, CR
Fast Light Green in powder and liquid quintuple

Blues: Alizarine Blue BRG, BR3G
Brilliant Wool Blue G extra
Fast Acid Blue B, B extra (fairly good)
Intensive Blue (fairly good)
New Patent Blue B, 4B, GA (fairly good)
New Victoria Blue B
Sulphon Acid Blue B
Victoria Blue B
Wool Blue N extra, R extra

Violets: Acid Violet 8B extra
Alkali Violet R, LR
Fast Acid Violet 10B

Blacks: Naphthaline Acid Black 4B
Phenylamine Black 4B
Victoria Black B, G
Victoria Black Blue

197. **Acid** and **slightly acid dyeing colours,** which when **dyed** or **printed** on **silk** are **remarkably fast to light:**

Reds: Azo Eosine
Azo Fuchsine B, 6B, G, S
Brilliant Croceine 3B
Brilliant Double Scarlet 3 R
Brilliant Ponceau 4R, 5R
Carmoisine B
Cloth Red B, G, G extra, 3 G extra
Cochineal Scarlet PS
Croceine Scarlet 1B—10B, R
Imperial Scarlet 3B, 1B
Metanil Red 3B, 3B extra
Orseilline BB

Oranges: Croceine Orange G, R
Fast Light Orange G
Golden Orange
Mandarine G
Orange II B

Yellows: Fast Light Yellow G, 3G
Fast Yellow extra
Tartrazine

Greens: Alizarine Green CE and CG extra in paste and in powder

Blues: Alizarine Blue SAP in powder
Alizarine Blue BR3G in paste and in powder
Brilliant Blue extra greenish
Cotton Blue I—VI, greenish,
Fast Blue greenish
Induline B
Night Blue extra greenish
Red Blue extra concen.
Silk Blue BES, BSP
Soluble Blue greenish I, reddish I
Sulphon Acid Blue B, R, G

Violets: Azo Acid Violet B extra, R extra, 4R
Alizarine Blue JR in paste

Greys: Nigrosine B, G

Blacks: Phenylamine Black 4B
Victoria Black B, G, 5G

198. **Acid** and **slightly acid dyeing colours,** which when **dyed** or **printed** on **silk** are **fast to stoving:**

Reds: Azo Eosine
Azo Fuchsine B, G, S
Azo Phloxine 2 G
Cloth Red 3 B, 3 G extra
Cochineal Scarlet PS
Fast Red B T
Orseillire B B
Ponceau 2 R (fairly good)
Rhodamine B, B extra, G, G extra

Oranges: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange II B, G T

Yellows: Fast Light Yellow G, 3 G
Indian Yellow G
Naphtole Yellow S
Naphtylamine Yellow
Quinoline Yellow
Tartrazine

Greens: Alizarine Green C E and C G extra in paste and in powder
Brilliant Acid Green 6 B
Fast Green W, extra bluish
Wool Green B S

Blues: Alizarine Blue S K Y in powder and in paste
Brilliant Wool Blue B extra
Induline B
New Patent Blue B, 4 B, G A
New Victoria Blue B
Victoria Blue B
Wool Blue N extra, S R extra, R extra

Violets: Acid Violet 4 B extra, R extra, 5 B, 8 B extra, H W, 6 B N
Alkali Violet R, L R
Azo Acid Violet B extra, 4 R, R extra

Greys: Nigrosine B, G

Blacks: Phenylamine Black 4 B, T
Victoria Black B, G

199. **Acid colours,** which when **dyed** on **silk** can be **discharged** with **zinc powder:**

Reds: Azo Bordeaux
Azo Crimson S
Azo Eosine
Azo Fuchsine G
Azo Phloxine 2G
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R
Carmoisine B
Croceine Scarlet 2BX, 3BX, 1B, 3B, 5B
Double Ponceau 4R
Fast Red A, BT, E, NS
Fast Acid Magenta B
Imperial Scarlet 3B

Oranges: Croceine Orange G (yellowish)
Fast Light Orange G
Orange HB, RO

Yellows: Fast Yellow extra

Greens: *Acid Green GB extra, GG extra
*Fast Green bluish, *extra bluish

Blues: Azo Acid Blue 4B, 6B
*Brilliant Blue extra greenish
*Brilliant Wool Blue B extra
*Fast Acid Blue B, B extra
*Intensive Blue
*Red Blue extra concen.
*Silk Blue BES
Soluble Blue greenish I, reddish I
Sulphon Acid Blue B, R (yellow)

Violets: *Acid Violet 5B, 7B, 3R, BW
Azo Acid Violet R extra, 4R
*Fast Acid Violet 10B

Blacks: Victoria Black B

200. **Acid colours,** which **not** being **destroyed** by **zinc powder** are therefore adapted with **zinc powder** for **colour discharges** on **silk dyed** with dischargeable colours:

Yellows: Quinoline Yellow

Blues: Induline B

Those dyestuffs marked with an asterisk, although dischargeable with zinc powder, are acted upon by the oxygen of the air, and the colour returns slightly in the discharged pattern.

Recipe for Colour Discharging

Dissolve:

3 oz.	or 30 grms.	**Quinoline Yellow**	in
1/2 pint	» 100 »	water, thicken with	
1 1/2 pints	» 300 »	gum solution 1 : 1, add	
30 oz.	» 300 »	zinc powder best quality, and then add whilst cooling down with ice	
1 1/4 pints	» 270 »	sodium bisulphite 71° Tw.	
	1000 grms.		

Steam for 1 hour without pressure (if necessary acidulate slightly), wash and dry

201a. **Acid colours** which when dyed on **silk** are dischargeable with Hydrosulphite NF.

Reds: Acid Magenta
Azo Bordeaux
Azo Eosine
Azo Fuchsine G, B, 6B, S
Azo Crimson S, L
Azo Phloxine 2G
Bordeaux extra
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R, 5R
Carmoisine B
Cochineal Scarlet PS
Cloth Red 3B extra (readily enough), 3G extra (fairly easily), B (easily), G (easily), G extra (easily)
Croceine Scarlet 10B, 9B, 7B, 5B, 3B, 2B, 1B, R, 2BX, 3BX
Double Ponceau 1R, 2R, 3R, 4R
Fast Red NS, BT, A, E
Fast Acid Magenta B
Imperial Scarlet 1B, 3B
Metanile Red 3B, 3B extra
Orseilline BB
Orange R
Ponceau 1R, 2R, 2RL, 3R

Oranges: Croceine Orange G, R
Golden Orange
Mandarine G

Oranges: Orange IIB, GT

Yellows: Fast Light Yellow 3G (easily), G (readily enough)
Indian Yellow G, R
Naphtole Yellow S
Naphtylamine Yellow (moderately well)
New Yellow, extra concen.
Tartrazine

Greens: *Acid Green 3B, GG extra, GB extra, G extra, 6B, BB extra, BBN extra
*Brilliant Acid Green 6B
*Fast Green CR, W, bluish, extra, extra bluish
*Fast Light Green powder and liquid quintuple (fairly easily)
*New Acid Green 3BX, GX
*Wool Green BS

Blues: Azo Acid Blue 4B, 6B
Alkali Blue 1B—6B, 1R—6R extra
Black 21455 (fairly easily)
Brilliant Blue extra greenish
Brilliant Wool Blue B extra
*Carmine Blue B, G
Cotton Blue I—VI, R, RR
*Fast Acid Blue B
*Intensive Blue
Night Blue extra greenish
*New Patent Blue B, 4B, GA
*Red Blue extra concen.
Silk Blue BES, BSP
Soluble Blue greenish I, reddish I
*Wool Blue R extra, N extra

Violets: *Acid Violet 7B, 4B extra, HW, R extra, BW, 5B, 4RS, 3B extra, 4BG extra and 6BN (fairly easily)
*Alkali Violet R and RL (fairly easily)
Azo Acid Violet R extra, 4R, B extra

Blacks: Naphthaline Acid Black 4B (fairly easily)
Phenylamine Black 4B and T (readily enough)

* The discharges on some Triphenylmethan dyestuffs, namely those marked with an asterisk, sometimes become coloured again when exposed to the action of the atmosphere, so it is advisable to employ them for colour discharges.

Blacks: Victoria Black B and G (easily), 5 G (readily enough)
Victoria Black Blue (readily enough)
Wool Black N 4 B (readily enough)

201 b. **Colours** which are suitable **in conjunction with Hydrosulphite NF** for **colour discharges** on silk material:

Reds: Eosine S extra bluish
Rhodamine B, B extra, G G extra
Oranges: Coriphosphine O
Eosine S extra yellowish
Yellows: Auramine O
Quinoline Yellow
Blues: Fram Blue G
Lazuline Blue R

General Recipe for Colour Discharging.

Mix:

3—4	oz.	or 30 — 40	grms.	**Undischargeable dyestuff**
3	pints	» 618—608	»	gum water 1 : 1
4 3/4	oz.	» 48	»	wheat starch and
2 1/2	»	» 24	»	dextrine, stir in
1/2	pint	» 100	»	water, boil up and then add
2 2/5	noggs.	» 120	»	acetate of tin 32° Tw.
6	oz.	» 60	»	tin crystals
		1000 grms.		

Print the above printing paste on the silk dyed with Acid colours, then steam for 1/4 hour without pressure and wash.

202. **Benzidine colours,** which are adapted for the **dyeing** of **silk** in a boiled off soap liquor broken with acetic acid:

Reds: Benzo Fast Pink 2 BL
Benzo Fast Red GL, L
Benzo Fast Scarlet 4 BS, 5 BS, 8 BS, G S
Benzo Purpurine 1 B
Benzo Red S G
Benzo Rhoduline Red B, 3 B
Brilliant Congo R
Brilliant Geranine B, 3 B
Delta Purpurine 5 B

Reds: Diazo Bordeaux (Dev. A)
Geranine BB, G
Hessian Purple N
Primuline Yellow (Dev. A)
Rose Azurine B, G

Oranges: Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Pluto Orange G
Primuline Yellow (Dev. F)
Toluylene Orange G, R

Yellows: Benzo Fast Yellow 5GL
Chloramine Yellow GG, M
Chrysophenine, GS
Direct Yellow R, R extra
Primuline Yellow (Paranitraniline)

Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B

Blues: Azo Blue
Benzo Azurine G, 3G, R
Benzo Blue BX, 2B, 3B, RW
Benzo Cyanine 3B
Benzo Fast Blue B, 5R
Benzo Indigo Blue
Benzo Sky Blue, concentrated
Brilliant Azurine B, 5G, 2R, 5R
Brilliant Benzo Blue 6B
Brilliant Sulphon Azurine R
Chicago Blue B, R
Diazo Black B, R (undiazotised)
Diazo Blue 3R (Dev. A)
Diazo Blue Black (undiazotised)
Diazo Indigo Blue B and M (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazurine B

Violets: Azo Violet
Benzo Fast Violet R
Benzo Violet R, RL extra
Chloramine Violet R

Violets: Congo Corinth B, G
Heliotrope BB

Browns: Benzo Brown B, BX, BR, G, GG, D3G extra, R extra
Benzo Chrom Brown B, BS, CR, G, 5G, R
Benzo Nitrol Brown G, 2R, RO (Paranitraniline)
Cotton Brown I, II, III, IV
Diazo Brown G, (Dev. A) (Dev. H); R extra diazotised and developed with soda
Direct Bronze Brown
Direct Fast Brown B
Pluto Orange G (Paranitraniline)

Greys: Benzo Fast Black
Benzo Fast Grey
Benzo Grey S extra

Blacks: Benzo Fast Black (direct and Dev. A)
*Diazethyl Black B, R (Dev. B)
*Diazo Black 2B, B, R (Dev. A)
*Diazo Brilliant Black B, R (Dev. B)
Diazo Fast Black SD (Dev. F)
Direct Blue Black B
*Direct Deep Black E, E extra, RW, RW extra (Dev. A)
Pluto Black A, F extra

Directions for Dyeing.

a) Dyed Direct.

Dye the well dissolved and filtered Benzidine colour on silk in a boiled off soap bath broken with acetic acid (2—5%), or with 10—20% Glauber's salt crystals and 1—2% acetic acid added afterwards. Enter the silk luke warm, warm up slowly to 195° Faht. and dye for 1 hour at this temperature. Add the acetic acid gradually, so that the Benzidine colour does not fall on the silk too quickly and produce uneven shades. For dark shades take up to 10% acetic acid.

b) Diazotised and Developed Shades.

Shades on silk dyed with Benzidine colours are diazotised with 2—3% nitrite and 8—10% hydro-

* Those colours marked with an asterisk are dyed best with the addition of Glauber's or common salt.

chloric acid and developed with the respective developers in the same way as on cotton; see recipe under No. 9 page 15, in which full details for working will be found.

203. **Benzidine colours**, which are adapted for **printing silk:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Red L, GL
Benzo Fast Scarlet 4BS, GS, 5BS
Benzo Purpurine 1B, 4B, 6B
Benzo Red SG
Benzo Rhoduline Red B, 3B
Brilliant Congo R
Brilliant Geranine B, 3B
Brilliant Purpurine R
Delta Purpurine 5B
Geranine BB, G
Rose Azurine B, G
Trona Red GG

Oranges: Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Pluto Orange G

Yellows: Benzo Fast Yellow 5GL
Chloramine Yellow GG, M
Chrysamine G, R
Chrysophenine G
Direct Yellow R, R extra
Thiazole Yellow R

Greens: Benzo Dark Green B, GG
Benzo Green BB, G

Blues: Benzo Azurine G
Benzo Blue BX, 2B, 3B, RW
Benzo Fast Blue BN
Benzo Sky Blue, concentrated
Brilliant Azurine 2R, 5R, B
Brilliant Benzo Blue 6B
Diazo Fast Black 3B, G

Violets: Benzo Fast Violet R
Benzo Violet R, RL extra
Chloramine Violet R
Congo Corinth B, G
Heliotrope BB

Browns: Benzo Chrome Brown BS, B, G
Benzo Brown RC, D3G extra, G, GG, NB
Cotton Bzown IV
Direct Fast Brown B, GG
Pluto Brown NB, GG

Greys: Benzo Fast Black
Benzo Fast Grey
Direct Blue Black 2B
Pluto Black FR, CR

Blacks: Benzo Fast Black
Pluto Black BS extra, CR, L extra

Directions for Printing.

a) Silk Cloth.

General Recipe for Printing.

Boil:

2	oz.	or 20	grms.	**Benzidine colour**
30	»	» 300	»	British gum and
3 1/3	pints	» 660	»	water, to which add
2	oz.	» 20	»	phosphate of soda
		1000	grms.	

Steam for 1 hour without pressure, soap slightly, wash and dry.

b) Silk Yarn.

Dissolve:

2	oz.	or 20	grms.	**Benzidine colour** in
1 4/5	pints	» 360	»	water, thicken with
3	»	» 600	»	mucilage of tragacanth 65 : 1000, then add
2	oz.	» 20	»	phosphate of soda
		1000	grms.	

Steam for 1 hour without pressure, wash and dry.

204. **Benzidine colours,** which when **dyed** or **printed** on **silk** are **fast to alkali** (resisting **20% ammonia**):

Reds: Benzo Fast Pink 2BL
Benzo Fast Scarlet 4BS
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Rhoduline Red B, 3B
Brilliant Congo R
Brilliant Geranine B, 3B
Brilliant Purpurine R
Delta Purpurine 5B
Diazo Bordeaux (Dev. A)

Reds:	Geranine BB
	Hessian Purple N
	Primuline Yellow (Dev. A)
	Rose Azurine B, G
Oranges:	Benzo Fast Orange S
	Chloramine Orange G
	Congo Orange G, R
	Pluto Orange G
	Primuline Yellow (Dev. F)
Yellows	Chloramine Yellow GG, M
	Chrysophenine, GS
	Direct Yellow R, R extra
	Primuline Yellow (Paranitraniline)
	Thiazole Yellow R
Greens:	Benzo Green BB, G
	Brilliant Benzo Green B
Blues:	Benzo Blue BX, 2B, 3B, RW
	Benzo Cyanine 3B
	Benzo Fast Blue B
	Brilliant Azurine 5G, 2R, 5R
	Brilliant Benzo Blue 6B
	Diazo Black B (undiazotised)
	Diazo Blue 3R (Dev. A)
	Diazo Blue Black (undiazotised)
	Diazo Red Blue 3R (Dev. A)
Violets:	Benzo Fast Violet R
	Benzo Violet R
	Chloramine Violet R
	Congo Corinth B, G
Browns:	Benzo Brown B, BR, G, GG
	Benzo Chrome Brown B, BS, R
	Benzo Nitrol Brown G, RO, 2R (Paranitraniline)
	Cotton Brown I, II, III, IV
	Diazo Brown G, (Dev. A)
	Direct Bronze Brown
	Direct Fast Brown B
Greys:	Benzo Fast Black
	Benzo Fast Grey
	Pluto Black FR
Blacks:	Benzo Fast Black
	Benzo Fast Black (Dev. A)

Blacks: Diazethyl Black B, R (Dev. A)
Diazo Black 2B (Dev. A)
Diazo Brilliant Black B, R (Dev. B)
Direct Blue Black 2B
Pluto Black BS extra

205. **Benzidine colours,** which when **dyed** on **silk** are **fast to milling:**

Reds: Benzo Purpurine 1B (fairly good)
Benzo Rhoduline Red B, 3B (fairly good)
Brilliant Geranine B, 3B (fairly good)
Delta Purpurine 5B (fairly good)
Diazo Bordeaux (Dev. A)
Geranine BB, G, (fairly good)
Primuline Yellow (Dev. A)
Rose Azurine B, G

Oranges: Chloramine Orange G (fairly good)
Congo Orange G
Primuline Yellow (Dev. F) fairly good)

Yellows: Chloramine Yellow GG, M
Chrysophenine G
Direct Yellow R, R extra

Greens: Benzo Dark Green B, GG

Blues: Brilliant Azurine 5G (fairly good)
Diazo Blue (Dev. A) (fairly good)
Diazo Red Blue 3R (Dev. A)
Diazurine B (Dev. A)

Violets: Benzo Fast Violet R
Chloramine Violet R

Browns: Benzo Chrome Brown G
Benzo Chrome Brown B, BS, CR, G, 5G, R (chromed)
Benzo Nitrol Brown G, 2R, RO (Para-nitraniline)
Diazo Brown G (Dev. A)

Greys: Benzo Fast Black (Dev. A)

Blacks: Benzo Fast Black (Dev. A)
Diazethyl Black B, R (Dev. B)
Diazo Black 2B (Dev. A)
Diazo Brilliant Black B, R (Dev. A)

206. **Benzidine colours,** which when **dyed** or **printed** on **silk** are **remarkably fast to water:**

Reds: Benzo Fast Red L

Reds: Benzo Fast Scarlet 4BS (good) GS (fairly good)
Brilliant Purpurine R (almost good)
Diazo Bordeaux (Dev. A)
Primuline Yellow (Dev. A)
Oranges: Chloramine Orange G
Mikado Orange G, (fairly good)
Primuline Yellow (Dev. F)
Yellows: Chloramine Yellow M (almost good), GG
Chrysophenine G (almost good)
Primuline Yellow (Paranitraniline)
Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Blues: Diazo Blue (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazurine B (Dev. A)
Violets: Benzo Fast Violet R
Chloramine Violet R (almost good)
Browns: Benzo Nitrol Brown G, 2R, RO (Paranitraniline)
Diazo Brown G (Dev. A)
Direct Fast Brown B
Pluto Orange G (Paranitraniline)
Greys: Benzo Fast Black (Dev. A)
Blacks: Benzo Fast Black (Dev. A)
Diazethyl Black B, R (Dev. B) (almost good) (reddish)
Diazo Brilliant Black B, R (Dev. A)
Diazo Black 2B (Dev. A)
Diazo Fast Black SD (Dev. F)

207. **Benzidine colours**, which when **dyed** or **printed** on **silk** are **remarkably fast to light**:

Reds: Benzo Fast Red L
Brilliant Geranine B, 3B
Geranine BB, G
Oranges: Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R
Mikado Orange G
Pluto Orange G
Toluylene Orange G
Yellows: Benzo Fast Yellow 5GL

Yellows: Chloramine Yellow M
Chrysamine R
Chrysophenine G
Blues: Benzo Fast Blue B
Diazo Blue Black
Browns: Benzo Chrome Brown G
Diazo Brown G
Greys: Benzo Fast Black
Blacks: Benzo Fast Black

208. **Benzidine colours,** which when **dyed** on **silk** can be **discharged** with **zinc powder** and **bisulphite**:

Reds: Benzo Fast Pink 2BL
Benzo Fast Scarlet 4BS, GS (becomes subsequently yellow)
Benzo Purpurine 1B, 4B
Benzo Rhoduline Red B, 3B
Brilliant Congo R
Brilliant Geranine B, 3B
Delta Purpurine 5B, 7B
Geranine G (yellowish), BB
Rose Azurine G, B
Oranges: Benzo Fast Orange S
Benzo Orange R
Congo Orange G, R (yellowish)
Pluto Orange G
Toluylene Orange R
Yellows: Chrysamine G
Chrysophenine G
Greens: Benzo Dark Green B, GG
Benzo Green G, BB
Benzo Olive (yellow)
Blues: Benzo Blue 2B, BX
Benzo Blue RW (reddish)
Benzo Chrome Black Blue B
Benzo Cyanine B, 3B, R
Benzo Fast Blue B
Benzo Indigo Blue
Brilliant Azurine 5G
Brilliant Benzo Blue 6B
Diazo Blue (Dev. A)
Diazo Indigo Blue M (Dev. A)
Violets: Azo Violet

Violets: Benzo Fast Violet R
Benzo Violet R
Congo Corinth B, G
Heliotrope BB
Browns: Benzo Brown B
Benzo Chrome Brown G, BS
New Toluylene Brown B
Greys: Benzo Fast Black
Benzo Grey S extra (yellow)
Blacks: Benzo Fast Black (reddish brown)
Benzo Black S extra (yellow)
Diazo Blue Black B (yellowish)
Diazo Brilliant Black B, R (Dev. A) (reddish)
Diazo Black 2B, R (Dev. A)
Direct Blue Black B (yellowish)
Direct Deep Black E
Pluto Black A, F extra

209. Colours, which **not** being **destroyed** by **zinc powder** and **bisulphite** are therefore adapted for **colour discharging silk** dyed with **dischargeable Benzidine colours:**

Reds: Brilliant Rhoduline Red BD in paste
Rhoduline Red B, G
Saffranine FF extra
Oranges: Coriphosphine O, OX, OX extra
Phosphine N
Yellows: Quinoline Yellow
Blues: Induline Blue B
Methylene Blue BB
Rhoduline Sky Blue 2B
Violets: Rhoduline Heliotrope B, 3B
Rhoduline Violet

Recipe for Colour Discharging.

Dissolve:

1 1/4 oz.	or	6 grms.	**Methylene Blue BB**	in
1 pint	»	94 »	water	and
3 »	»	300 »	gum solution 1 : 1;	when cold add
4 lbs.	»	320 »	zinc powder best quality,	strain, and then add slowly whilst cooling with ice
2 3/4 pints	»	280 »	sodium bisulphite 71° Tw.	
		1000 grms.		

Dissolve:

6	oz.	or 30	grms.	**Quinoline Yellow** in
1	pint	» 100	»	water, thicken with
3	»	» 300	»	gum solution 1 : 1, add
3 3/4	lbs.	» 300	»	zinc powder best quality, and then add whilst cooling with ice
2 1/2	pints	» 270	»	sodium bisulphite 71° Tw.
		1000	grms.	

Steam for 1/2 hour without pressure, wash and dry.

210. **Benzidine colours,** which when **dyed** on **silk** can be **discharged** with **acetate of tin:**

Reds: Benzo Fast Pink 2BL
Benzo Purpurine 1B, 4B, 10B
Benzo Rhoduline Red B
Brilliant Congo R
Brilliant Geranine B, 3B
Delta Purpurine 5B
Geranine G
Rose Azurine B, G

Oranges: Benzo Orange R
Chloramine Orange G
Congo Orange R
Toluylene Orange G, R

Yellows: Chrysophenine G

Greens: Benzo Dark Green B
Benzo Green BB, G
Benzo Olive

Blues: Azo Blue
Benzo Azurine G, 3G, R
Benzo Blue 2B, 3B, BX
Benzo Cyanine 3B
Benzo Fast Blue B
Benzo Indigo Blue
Benzo Sky Blue, concentrated
Brilliant Azurine B, 5G
Brilliant Benzo Blue 6B
Brilliant Sulphon Azurine R
Diazo Blue 3R (Dev. A)
Diazo Blue Black
Diazo Indigo Blue B, M (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazo Black R

Violets: Azo Violet
Benzo Fast Violet R
Benzo Violet R, RL extra
Congo Corinth B, G
Heliotrope BB

Browns: Benzo Chrome Brown B, BS, G, R
Benzo Dark Brown
Direct Bronze Brown
Direct Fast Brown B

Greys: Benzo Fast Grey
Benzo Grey S extra

Blacks: Benzo Chrome Black N
Diazo Brilliant Black B (Dev. A) (yellowish)
Diazo Black BHN, BHN extra, 2B, 3B, H (Dev. A)
Direct Deep Black E, E extra, RW, RW extra

White Discharge A.

Boil:

4 1/5 pints or 844 grms. acetate of tin 32° Tw.
10 1/2 oz. » 105 » wheat starch and add
5 » » 50 » citric acid crystals

1000 grms.

White Discharge B.

Stir cold:

5 —10 oz. or 50—100 grms. tin crystals and
2 1/2— 5 » » 25— 50 » acetate of soda into
5 pints » 1 litre British gum thickening.

Allow the printing paste to stand several hours until the acetate of soda is completely dissolved, then strain.

Discharge White II, see page 43 under No. 23, can also be employed.

Steam for about 5—10 mins. without pressure, wash and dry.

211. Undischargeable colours adapted for **colour discharging** with **tin** on **silk** dyed with **dischargeable Benzidine colours:**

Reds: Eosine S extra blue shade, S extra yellow shade
Pyronine G
Rhodamine B, G, B extra, G extra
Rhoduline Red BG
Saffranine FF extra

Oranges: Coriphosphine O, OX, OX extra
Auracine G
Yellows: Auramine O, I, II, concentrated
Quinoline Yellow
Greens: Acid Green BBN extra, 3B, GG extra
Alkali Fast Green B, G
Brilliant Acid Green 6B
Brilliant Green Cryst.
China Green Cryst.
Fast Green bluish, extra bluish W, CR
Fast Light Green in powder and liquid quintuple
Blues: Fast Acid Blue B, B extra
Intensive Blue
New Patent Blue 4B, GA
Victoria Blue B
Wool Blue R extra
Violets: Acid Violet 4B extra, 5B, 6BN, 8B extra, HW, R extra
Alizarine Blue JR paste
Fast Acid Violet 10B
Methyl Violet 5R—7B
Rhoduline Heliotrope B
Rhoduline Violet

211a. **Benzidine colours** which when **dyed** on **silk** are **dischargeable** with **Hydrosulphite NF.**

Reds: Benzo Fast Pink 2BL (easily)
Benzo Fast Scarlet 4BS and GS (easily)
Benzo Rhoduline Red B and 3B (easily)
Brilliant Geranine B and 3B (yellowish)
Geranine BB (yellowish) G (easily)
Oranges: Benzo Fast Orange S (easily)
Benzo Orange R (easily)
Yellows: Chrysamine G (easily)
Chrysophenine G (easily)
Greens: Benzo Dark Green B and 2G (easily)
Benzo Green BB, C and G (easily)
Benzo Olive (easily)
Brilliant Benzo Green B (easily)
Blues: Benzo Blue 2B and BX (easily)
Benzo Blue RW (fairly easily)

Blues: Benzo Chrome Black Blue B (easily)
Benzo Cyanine B, R and 3B (easily)
Benzo Fast Blue B (easily)
Benzo Indigo Blue (easily)
Brilliant Azurine 5G (easily)
Brilliant Benzo Blue 6B (easily)
Diazo Blue (Dev. A) (fairly easily)
Diazo Blue Black B (easily)
Diazo Indigo Blue M (Dev. A) (easily)

Violets: Azo Violet (easily)
Benzo Fast Violet R (easily)
Benzo Violet R (easily)
Congo Corinth B and G (easily)
Heliotrope BB (easily)

Browns: Benzo Brown B (fairly easily)
Benzo Chrome Brown BB and G (easily)

Greys: Benzo Fast Black (easily)
Benzo Grey S extra (easily)
Pluto Black A (easily)

Blacks: Benzo Fast Black (easily)
Benzo Black S extra (easily)
Diazo Brilliant Black B (Dev. A) (fairly easily)
R (Dev. A), (reddish)
Diazo Black 2B (Dev. A) and R (Dev. A) (fairly easily)
Direct Blue Black B (easily)
Direct Deep Black E (easily)
Pluto Black F extra (easily)

General Recipe for Colour Discharging.

Boil:

3—4 oz.	or 30—40 grms.	**Undischargeable colour**
3 pints	» 618—608 »	gum solution 1 : 1
4 3/4 oz.	» 48 »	wheat starch
2 1/2 »	» 24 »	dextrine and
1/2 pint	» 100 »	water, add
2 2/5 noggs.	» 120 »	acetate of tin 32° Tw.
6 oz.	» 60 »	tin crystals
	1000 grms.	

Steam for 1/4 hour without pressure, wash and dry.

212. **Basic colours,** which are adapted for the **dyeing** of **silk** in a boiled off soap bath broken with acetic acid, or for dyeing in a soap bath:

Reds: Brilliant Rhoduline Red B
Diamond Fuchsine
Rhodamine B, G, 4G, 5G, B extra, G extra
Rhoduline Red B, G
Saffranine FF extra, BB extra

Oranges: Chrysoidine Cryst.
Phosphine N
Auracine G

Yellows: Auramine O, J, II, concentrated

Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Emerald Green Cryst.

Blues: *Cotton Blue VI—I, R, RR
Methylene Blue BB
New Fast Blue F, H
New Victoria Blue B
Rhoduline Blue R
Rhoduline Sky Blue 2B
Turquoise Blue BB, G
Victoria Blue B

Violets: Brilliant Rhoduline Purple R
Methyl Violet 1B—7B, 1R—5R
Rhoduline Heliotrope B, 3B
Rhoduline Violet

Browns: Bismarck Brown F, FF, M, R, R extra

Black: Jute Coal Black S (for silk burls)

Directions for Dyeing.

Prepare the bath with 10% olive oil soap or with boiled off soap liquor and 1—2% acetic acid, add the well dissolved and filtered colour, enter the goods luke warm, then warm up slowly to 140—180° Faht., rinse well and scroop with ¼ oz. acetic or tartaric acid per 10 gallons water. (Sulphuric acid, which has great effect on the shade of many Basic colours, should be avoided).

* It is better to dye these in a boiled off soap bath broken with sulphuric acid.

Remark 1: It is best to employ distilled water for dissolving Basic colours. Colours which are soluble with difficulty should be stirred up with an equal amount of pure glycerine and 4 times as much alcohol, then warmed up on the water bath and the thick paste thus obtained dissolved with hot water.

Remark 2: By after-treating with tannic acid the shades are rendered faster to water.

213. **Basic colours,** which are adapted for the **printing** of **silk:**

Reds: Brilliant Rhoduline Red BD in paste
Diamond Fuchsine
New Magenta
Pyronine G
Rhodamine B, G, 4G, 5G, S, B extra, G extra, S extra
Rhoduline Red B, GD in paste
Saffranine FF extra, A, B extra, BB extra

Oranges: Coriphosphine O, OX, OX extra
Phosphine N

Yellows: Auracine G
Auramine O, I, II, concentrated

Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Methyl Green
Emerald Green Cryst.

Blues: Blue 8336 (Navy Blue)
Methylene Blue BB
New Blue D, R extra
New Fast Blue F
New Victoria Blue B
Rhoduline Blue R, GG extra
Rhoduline Sky Blue 2B
Turquoise Blue BB, G
Victoria Blue B

Violets: Brilliant Rhoduline Purple R
Methyl Violet 7B—5R
Rhoduline Heliotrope B, 3B
Rhoduline Violet

Browns: Bismarck Brown F, FF, M, R extra

Greys: New Fast Grey
Blacks: Jute Coal Black S
Jute Black B

General Directions for Printing.

a) For Cloth.

Dissolve:

2 oz.	or 20 grms.	**Basic colour**	in
1 1/10 pints	» 220 »	water	and
1/2 pint	» 100 »	acetic acid 9° Tw. (30%), thicken with	
3 pints	» 600 »	gum solution 1 : 1,	add
1 1/5 noggs.	» 60 »	acetic acid tannic acid solution 1 : 1	
	1000 grms.		

Steam for 1 hour without pressure, if necessary pass through a cold tartar emetic bath, (1 3/5 oz. per gallon water), wash and dry.

Basic colours can also be printed on silk without any addition of tannic acid, but the fastness to washing and light is then not so good.

b) For Yarn (Chiné).

Dissolve:

1 1/2 oz.	or 15 grms.	**Basic colour**	in
1 1/4 pints	» 260 »	water	and
3 1/8 noggs.	» 165 »	acetic acid 9° Tw. (30%), thicken with	
2 1/2 pints	» 500 »	gum water 1 : 1,	and then add
1 1/5 noggs.	» 60 »	acetic acid tannic acid solution 1 : 1	
	1000 grms		

Steam for 1 hour without pressure, if necessary run through a cold tartar emetic bath, wash and dry.

214. **Basic colours,** which when **dyed** or **printed** on **silk** are **fast to alkali** (resisting **20% ammonia**):

Reds: Brilliant Rhoduline Red B
Rhodamine B, G, 4G, 5G
Rhoduline Red B, G
Saffranine A, B extra, FF extra, BB extra
Yellows: Auracine G
Auramine O, I, II, concentrated
Blues: Methylene Blue BB

Blues: New Fast Blue F
New Victoria Blue B
Rhoduline Blue R
Rhoduline Sky Blue 2B
Turquoise Blue BB, G
Victoria Blue B
Violets: Rhoduline Heliotrope B, 3B
Rhoduline Violet
Browns: Bismarck Brown F, FF, M, R, R extra
Greys: New Fast Grey

215. **Basic colours,** which are adapted for **colour discharging** with **tin:**

Reds: Pyronine G
Rhodamine B, G
Saffranine FF extra
Oranges: Coriphosphine O, OX, OX extra
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
China Green Cryst.
Blues: Rhoduline Sky Blue 2B
Victoria Blue B
Violets: Brilliant Rhoduline Purple R
Methyl Violet 5R—7B
Rhoduline Heliotrope B
Rhoduline Violet

Colour discharging is done in the same way as stated on page 46 under No. 25, for Benzidine colours. Occasionally the wheat starch is omitted in the discharge paste and the quantity of gum water correspondingly increased. As tin crystals affect the silk during the steaming process, it is advisable, wherever possible, to steam only for a short time, and according to the discharge required employ a greater quantity of acetate of tin and as little tin crystals as possible.

216. **Basic colours,** which when **dyed** on **silk** can be **discharged** with **zinc powder** and **bisulphite:**

Reds: Rhodamine B, B extra
Yellows: Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green

Greens: Emerald Green Cryst.
Methyl Green I yellowish
Blues: New Victoria Blue B
Turquoise Blue BB, G
Victoria Blue B
Violets: Brilliant Rhoduline Purple R
Methyl Violet 1B—7B, 1R—5R
Browns: Bismarck Brown F, FF, M, R, R extra

The process of discharging is exactly the same as that stated for Benzidine colours (see under No. 26, page 49.

217. **Basic colours,** which **not** being **destroyed** by **zinc powder** are adapted for **colour discharging** with **zinc powder** on **silk** dyed with dischargeable colours:

Reds: Brilliant Rhoduline Red BD in paste
Rhoduline Red B, G
Saffranine A, B extra, BB extra, FF extra
Oranges: Coriphosphine O, OX, OX extra
Phosphine N
Blues: Methylene Blue BB
Rhoduline Blue R
Rhoduline Sky Blue 2B
Violets: Rhoduline Heliotrope B, 3B
Rhoduline Violet

General Recipe for Colour Discharging.

Dissolve:

3/5 — 3 oz.	or	6—	30 grms.	**Basic colour** in
5/8 — 1 1/2 pint	»	124—100	»	water, thicken with
1 1/2 pints	»	300	»	gum solution 1 : 1, add
30 oz.	»	300	»	zinc powder (best powdered quality) and then add whilst cooling down with ice
5 1/4 noggs.	»	270	»	sodium bisulphite 71° Tw.
		1000 grms.		

Steam for 1 hour without pressure, wash and dry.

Remarks: Should it not be possible to remove the zinc powder sufficiently from the discharged material by washing, then acidulate slightly, wash and dry.

218. **Basic colours** adapted for **shading silk** dyed with **logwood black:**

Reds: Brilliant Rhodaline Red B
New Magenta
Oranges: Chrysoidine Cryst.
Yellows: Auramine conc.
Greens: Brilliant Green Cryst.
Blues: (Alkali Blue 6B, 6R extra)
Methylene Blue BB
Turquoise Blue BB, G
Violets: Methyl Violet B—5B

Silk dyed with Logwood is brightened in the scrooping bath cold containing the well dissolved and filtered basic colour.

Remark: Occasionally Alkali Blue is added direct to the Logwood soap bath.

219. **Mordant colours,** which are adapted for the **dyeing** of **silk** in a boiled off soap bath broken with acetic acid, on material prepared with **chrome mordant:**

Reds: Anthracene Red
Cloth Red B, 3B extra, G extra, 3G extra
Yellows: Anthracene Yellow in paste and in powder
Fast Printing Yellow 3G, R
Chrome Yellow in paste D, G, R extra in powder
Diamond Flavine G in paste and in powder
Diamond Yellow G in paste
Greens: Alizarine Green CE and CG extra in paste and in powder, CK powder
Alizarine Green V in paste and in powder, DG in paste
Alizarine Green in paste and in powder, S and SW in paste
Alizarine Green D, SS
Blues: Alizarine Blue GG, GW and R double, BM paste, S, S extra, SR, SR extra in paste and in powder
Alizarine Blue BAG and BAR in paste and in powder
Alizarine Cyanine HJ, GII, A in paste and in powder

Blues: Alizarine Blue BR 3 G in paste and in powder
Chrome Blue in paste
Celestine Blue B in powder
Violets: Alizarine GX, GGX in paste, BX in paste and in powder
Alizarine Blue 3 RX in powder and in paste
Chrome Violet in paste
Galleine in paste and in powder
Browns: Acid Anthracene Brown R, T and W in powder
Alizarine Orange G, GG, RD, W in paste R in paste and in powder
Alizarine Red IIAB, SX extra in paste
Anthracene Brown GG, RD, W in paste, R and G in paste und in powder
Diamond Brown in paste
Greys: Alizarine Black B and 3B in paste and in powder
Alizarine Black IA in paste and in powder
Blacks: Alizarine Black IA in paste and in powder
Diamond Black F, GA, NG (after-chromed)

a) Mordanting.

Allow the well cleaned silk (See under No. 193, page 283—285) to lie in chromium chloride 32° Tw. for 2—12 hours or over night, then wring out well, rinse well, best in running water, and then run through a soap bath at 175° Fahr (10% soap of the weight of the goods) or fix in a freshly prepared bath of silicate of soda or bicarbonate (10% of the weight of the goods), wring out and rinse well. The goods can be dyed as soon as they leave the chrome bath without first running them through soap, etc.

Remarks: As the chromium chloride bath becomes weak in the course of use, it must be brought up to 32° Tw. each time before use.

b) Dyeing.

Enter the mordanted goods, without first drying them, into the cold dye bath, prepared with about 4 gallons boiled off soap liquor and 1% acetic acid (of the

weight of the goods) and the requisite quantity of colour per 20 gallons of liquor. The colour is stirred up with about 10 times the quantity of cold water or dissolved in hot water and added to the bath through a fine sieve. Work the silk for 1/4 hour, warm up the bath in 3/4 hour to 195° Faht., and keep the bath at this temperature for 1 hour. Afterwards rinse, treat in two boiling soap baths (1/2 oz soap per gallon water), rinse again and scroop in a warm bath with 10% acetic acid. Wring out and dry, without first washing.

220. **Mordant colours,** which are adapted for the **dyeing** of **silk** in a boiled off soap bath broken with acetic acid, on material prepared with **alumina mordant:**

Reds: Alizarine Red IIAB, SX extra, XG, WR in paste

Oranges: Alizarine Orange G, GG, RD, W in paste, R in paste and in powder

Yellows: Anthracene Yellow in paste and in powder
Fast Printing Yellow 3 G in powder
Chrome Yellow R extra in powder

Greens: Alizarine Green in paste and in powder, S and SW in paste

Blues: Alizarine Blue GG, GW and R double, BM in paste, S, S extra, SR, SR extra in paste and in powder
Alizarine Blue BR 3 G in paste and in powder
Alizarine Blue HJ in paste and in powder

Violets: Alizarine Blue GII, B, A, 3 RX, 3 RX double in paste and in powder
Galleine in paste and in powder

Browns: Alizarine GX, GGX in paste, BX in paste and in powder
Anthracene Brown GG, RD, W in paste, G and R in paste and in powder

Greys: Alizarine Black IA in paste and in powder

a) Mordanting.

After the silk has been cleaned (See pages 283—285 under No. 193) it is entered into the sulphate of alumina solution neutralised with soda, prepared by dissolving

17½ oz. sulphate of alumina, free from iron, in 1 gallon water to which 4 oz. soda crystals dissolved in a pint water are added. The clear solution should be of about 12—15° Tw.. Work first for 20 mins., and then allow the goods to remain at least 4—12 hours, or over night, in the mordant bath, wring out, rinse well and run the mordanted silk through a soap bath at 175° Faht. (about 10% soap of the weight of the goods), then wring out and rinse. The mordant bath can be replenished and used for further lots. The mordanted silk is sometimes passed through a bath of silicate of soda or bicarbonate (10% of the weight of the goods) immediately it has been wrung out after leaving the mordant bath without first washing. The mordant baths must be brought up to proper strength each time before use.

b) Dyeing.

Silk mordanted with alumina is dyed according to the directions given on the preceding page under No. 219 for chrome mordanted silk.

221. **Mordant colours,** which are adapted for the **dyeing** of **silk** on **iron mordant:**

Yellows: Diamond Flavine G in paste and in powder

Greens: Anthracene Yellow in paste and in powder
Alizarine Green in paste and in powder, S and SW in paste

Blues: Alizarine Blue GG, GW and R double, BM in paste, S, S extra, SR, SR extra in paste and in powder
Alizarine Blue 3RX double in paste, B in paste and in powder

Violets: Alizarine GX, GGX in paste, BX in paste and in powder
Galleine in paste and in powder

Browns: Alizarine Orange G, GG, RD, W in paste, R in paste and in powder
Alizarine Red IIAB, SX extra in paste
Anthracene Brown G, R in paste, and in powder, RD, W and GG in paste

Greys: Alizarine Blue HJ, GII in paste and in powder

Blacks: Alizarine Black IA in paste and in powder

a) Mordanting.

The well cleaned silk (See pages 283—285 under No. 193) is allowed to lie for at least 2—4 hours, or over night, in a solution of nitrate of iron (basic sulphate) 32° Tw., then wrung out, rinsed well, entered a boiling soap bath, (about 20% soap of the weight of the goods) worked for at least ¼—1 hour and then rinsed.

b) Dyeing.

Silk mordanted with iron is dyed according to the directions given on page 316 under No. 219 for chrome mordanted silk.

222. **Mordant colours,** which can be **printed** on **silk:**

Reds: Alizarine Red IP, SX extra, etc. in paste, W in powder (alumina)
Brilliant Chrome Red in paste (Chrome)
Chrome Red R in paste and in powder (Chrome)

Oranges: Alizarine Orange G, GG, RD, W in paste, R in paste and in powder (alumina)
Diamond Orange in paste (Chrome)

Yellows: Anthracene Yellow in paste (Chrome)
Chrome Yellow G in powder (Chrome)
Chrome Yellow D in powder (Chrome)
Chrome Yellow, R extra in paste (Chrome)
Diamond Flavine G in paste (Chrome)
Diamond Yellow G in paste (Chrome)
Fast Printing Yellow 3G in powder (Chrome)

Greens: Alizarine Green CG extra in paste (Chrome)
Alizarine Green S and SW in paste (Chrome)
Alizarine Green V in paste and in powder DG in paste (Chrome)
Azo Green in paste (Chrome)
Chrome Green in powder (Chrome)

Blues: Alizarine Blue S, S extra, SR extra in paste and in powder (Chrome)
Alizarine Blue BAG and BAR in paste and in powder, SD in powder (Chrome)
Alizarine Blue BR3G in paste (Chrome)
Celestine Blue B (Chrome)
Chrome Blue in paste (Chrome)
Gallamine Blue in paste (Chrome)

Violets: Alizarine Blue R in paste (alumina)
Chrome Violet in paste (Chrome)
Galleine in paste (Chrome)

Browns: Alizarine BXP, BBXP, GXP, GGXP
Alizarine BRX paste (alumina)
in paste (alumina)
Alizarine Orange G, GG, R, RD, W in paste (Chrome)
Alizarine Red W in powder, WB in paste (Chrome)
Anthracene Brown G, GG, R, W in paste (Chrome)
Diamond Brown in paste (Chrome)

Blacks: Alizarine Black 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Alizarine Fast Black in paste (Chrome)

Directions for Printing.

A) With a Chrome Mordant.

British gum is best employed as thickening agent for print pastes in printing Mordant colours on silk, as colours fixed with acetate of chrome degum well, whereas when employing gum water and acetate of chrome the goods, when steamed, become too hard. Mucilage of tragacanth is sometimes used, especially for silk yarns (Chiné).

General Directions for Printing.

a) Cloth.

Boil:

15 oz. or 150 grms. **Mordant colour paste 20%**
or { ¾ oz. or 30 grms. in powder
{ 2½ noggs. „ 120 „ water
1½ pints » 300 » British gum and
1⅘ » » 360 » water; when cold add
1⅘ noggs. » 90 » acetate of chrome 32° Tw.
2 » » 100 » acetic acid 9° Tw. (30%)

1000 grms.

Instead of 2 noggins or 100 grms. acetic acid 9° Tw. about 1½—2 oz. or 15—20 grms. oxalic acid can be employed.

Steam for 1 hour without pressure, soap cold for 2 minutes, wash and dry.

Should gum solution be preferred as a thickening agent take sulphocyanide of chrome instead of acetate of chrome:

Thicken:

15 oz. or 150 grms. **Mordant colour in paste 20%** with
3 pints » 600 » gum solution 1 : 1, add
1/2 » » 100 » sulphocyanide of chrome 32° Tw., then add
2 oz. » 20 » oxalic acid dissolved in
1 3/5 noggs. » 80 » water, and finally
1 nogg. » 50 » acetic acid 9° Tw. (30%)

1000 grms.

Work in the same manner as mentioned on the preceding page.

b) for Yarn (Chiné).

Mix:

15 oz. or 150 grms. **Mordant colour paste 20%**
or 3 oz. or 30 grms. in powder
or 2 2/5 noggs. „ 120 „ water

1 — 2 4/5 pints » 200 — 570 » mucilage of tragacanth 65 : 1000
2 1/10 — 1/4 » » 420 — 50 » water, to which solution add
2 oz. » 20 » oxalic acid dissolved in
2 1/5 noggs. » 110 » water, and then add
2 » » 100 » acetate of chrome 32° Tw.

1000 grms.

Instead of mucilage of tragacanth 6 oz. British gum per pint printing paste can of course also be employed.

B) with Alumina mordant.
Directions for Printing.

Dissolve:

3 oz. or 30 grms. **Alizarine Red W powder** in
1/2 pint » 100 » water, thicken with
3 1/4 pints » 660 » British gum solution 1 : 1, add
4 oz. » 40 » sulphate of alumina dissolved in
1/2 pint » 100 » water, and then add
2 oz. » 20 » oxalic acid dissolved in
1 nogg. » 50 » water

1000 grms.

Mix:

15 oz.	or 150 grms.	**Alizarine Orange in paste 20%**	
2¾ pints	» 550 »	gum solution 1 : 1	
1 pint	» 200 »	acetate of alumina 18° Tw.	
1 nogg.	» 50 »	acetic acid 9° Tw. (30%)	
1 »	» 50 »	acetate of lime 23° Tw.	
	1000 grms.		

Steam the cloth for 1 hour without pressure and wash, if necessary soap cold, but only slightly.

223. **Mordant colours,** which when **dyed** or **printed** on **silk** are **fast to alkali** (resisting **20% ammonia**):

Reds: Alizarine Red IIAB, SX extra, WR, XG, etc. in paste (Alumina)
Anthracene Red (Chrome)
Cloth Red B, 3B extra, G extra, 3G extra (Chrome)

Oranges: Alizarine Orange G, GG, RP and W in paste, R in paste and in powder (Alumina)

Yellows: Anthracene Yellow in paste and in powder (Alumina) (Chrome)
Chrome Yellow R extra (Chrome) (Alumina)
Diamond Flavine G in paste and in powder (Chrome)
Diamond Yellow G in paste (Chrome)
Fast Printing Yellow 3G (Alumina) (Chrome)

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder (Chrome)
Alizarine Green in paste and in powder, S, SW in paste (Iron) (Chrome) (Alumina)
Alizarine Green D, SS (Chrome)

Blues: Alizarine Blue GG, GW, R double, BM in paste, S, S extra, SR extra paste and powder (Chrome) (Alumina) (Iron)
Alizarine Blue HJ, GII, A paste and powder (Chrome)
Alizarine Blue BAG and BAR in paste and in powder (Chrome)
Alizarine Blue BR3G in paste and in powder (Chrome)
Chrome Blue in paste (Chrome)
Celestine Blue B (Chrome)

Blues: Gallamine Blue in paste (Chrome)
Violets: Alizarine Blue EII, B in paste and in powde (Alumina)
Chrome Violet in paste (Chrome)
Galleine in paste and in powder (Alumina) (Chrome)
Browns: Acid Anthracene Brown R, T and W in powder (Chrome)
Alizarine BX in paste and in powder, GX, GGX in paste (Alumina)
Alizarine Blue 3RX double in paste and in powder (Alumina) (red violet)
Alizarine BRX paste (Alumina)
Alizarine Red IIAB, WR, SX extra, XG in paste (Iron)
Alizarine Orange G, GG, RP and W in paste, R in paste and in powder (Iron) (Chrome)
Anthracene Brown GG, W in paste (Iron) (Alumina) (Chrome)
Diamond Brown G in paste (Chrome)
Greys: Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Blacks: Alizarine Black IA in paste and in powder (Iron) (Chrome)
Diamond Black F, GA (after-chromed)

224. **Mordant colours,** which when **dyed** or **printed** on **silk** are **fast to water:**

Reds: Alizarine Red IIAB, SX extra, XG, WR in paste (Alumina)
Oranges: Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (Alumina)
Yellows: Anthracene Yellow in paste and in powder (alumina) (Chrome)
Chrome Yellow R extra (Chrome) (Alumina)
Diamond Yellow G in paste (Chrome)
Greens: Alizarine Green in paste and in powder, S and SW in paste (Alumina) (Chrome)
Anthracene Yellow in paste and in powder (Iron)

Greens: Alizarine Green D, SS (Chrome)
Blues: Alizarine Blue GG, GW, R double, BM in in paste, S, S extra, SR, SR extra in paste and in powder (Chrome) (Alumina) (Iron)
Alizarine Blue HJ in paste and in powder (Chrome)
Alizarine Blue BAG and BAR in paste and in powder (Chrome)
Chrome Blue in paste (Chrome)
Celestine Blue B (Chrome)
Violets: Alizarine Blue EH, B, A in paste and in powder, RG in paste (Alumina)
Chrome Violet in paste (Chrome)
Galleine in paste and in powder (Alumina) (Chrome)
Browns: Acid Anthracene Brown R, T and W in powder (Chrome)
Alizarine BX in paste and in powder, GX, GGX in paste (Alumina)
Alizarine Blue 3 RX double in paste (Alumina)
Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (Iron)
Alizarine Red IIAB, WR, SX extra, XG in paste (Chrome)
Anthracene Brown GG, RP, W in paste, G and R in paste and in powder (Iron) (Alumina) (Chrome)
Greys: Alizarine Black B and 3 B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)
Blacks: Alizarine Black IA in paste and in powder (Iron)
Diamond Black F, GA (after-chromed)

225. **Mordant colours,** which when **dyed** or **printed** on **silk** are **fast to milling:**

Reds: Alizarine Red IIAB, WR, SX extra, XG, etc. in paste (Alumina)
Oranges: Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (Alumina)
Yellows: Fast Printing Yellow 3 G (Chrome)
Anthracene Yellow in paste and in powder (Alumina) (Chrome)

Yellows: Chrome Yellow R extra (Chrome) (Alumina)
Diamond Flavine G in paste (Chrome)
Diamond Yellow G in paste (Chrome)

Greens: Alizarine Green in paste and in powder, S and SW in paste (Alumina) (Iron) (Chrome)
Alizarine Green D (Chrome)
Anthracene Yellow in paste and in powder (Iron)

Blues: Alizarine Blue GG, GW and R double, BM in paste, S, S extra, SR, SR extra in paste and in powder (Chrome)
Alizarine Blue H_4J in paste and in powder (Chrome)
Alizarine Blue BAG and BAR in paste and in powder (Chrome)
Celestine Blue B (Chrome)
Chrome Blue in paste (Chrome)

Violets: Alizarine Red IIAB, WR, SX extra, XG, etc. in paste (Iron)
Alizarine Blue EII, B, A, 3RX double in paste and in powder, RG in paste (Alumina)
Chrome Violet in paste (Chrome)
Gallëine in paste and in powder (Chrome) (Alumina) (Iron)

Browns: Alizarine BX in paste and in powder, GX, GGX in paste (Alumina) (Chrome)
Alizarine Orange G, GG, RP, W in paste R in paste and in powder (Iron) (Chrome)
Anthracene Brown G, R in paste and in powder, W, RP and GG in paste (Chrome) (Alumina) (Iron)
Diamond Brown in paste (Chrome)

Greys: Alizarine Black B and 3B in paste and in powder (Chrome)

Blacks: Alizarine Black IA in paste and in powder (Alumina) (Iron) (Chrome)
Diamond Black F (best after-chromed) (Chrome)

226. **Mordant colours,** which when **dyed** or **printed** on **silk** are **remarkably fast to light:**

Reds: Alizarine Red IIAB, SX extra, WR, XG in paste (Alumina)

Oranges: Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (Alumina)

Yellows: Fast Printing Yellow 3 G (Chrome)
Anthracene Yellow in paste and in powder (Alumina) (Chrome)
Chrome Yellow R extra paste and powder (Chrome)
Diamond Flavine G in paste and in powder (Chrome)
Diamond Yellow G in paste (Chrome)

Greens: Alizarine Green CE and CG extra in paste and in powder, CK in powder (Chrome)
Alizarine Green DG in paste, V in in paste
Alizarine Green in paste and in powder, S and SW in paste (Alumina) (Iron) (Chrome)
Alizarine Green D (Chrome)
and in powder (Chrome)
Anthracene Yellow in paste and in powder (Iron)

Blues: Alizarine Blue GG, GW and R double, BM in paste, S, S extra, SR, SR extra in paste and in powder (Chrome)
Alizarine Blue GII, B, A in paste and in powder and other brands (Chrome)
Alizarine Blue BAG and BAR in paste and in powder (Chrome)

Violets: Alizarine Blue B, A, 3RX in paste and in powder (Alumina)

Browns: Alizarine BXP, GXP, GGX, GGXP in paste, BX in powder and in paste (Alumina)
Alizarine Orange G, GG, RP, W in paste, R in paste and in powder (Chrome) (Iron)
Alizarine Red IIAB, WR, SX extra, XG etc. in paste (Chrome) (Iron)
Anthracene Brown GG, RP, W in paste G and R in paste and in powder (Chrome) (Iron)
Diamond Brown in paste (Chrome)

Greys: Alizarine Black B and 3B in paste and in powder (Chrome) (Alumina)

Greys: Alizarine Black IA in paste and in powder (Chrome) (Alumina)
Blacks: Alizarine Black IA in paste and in powder (Chrome) (Iron)
Diamond Black F, GA, NG (Chrome)

227. **Sulphon colours*** which are adapted for the **dyeing** of **silk** in a boiled off soap bath broken with acetic acid.

Reds: Anthracene Red
Greens: Alizarine Green D and SS (dye slightly acid)
Blues: Brilliant Sulphon Azurine R
Sulphon Azurine D
Sulphon Cyanine G, GR extra, 3R, 5R extra
Browns: New Sulphon Brown R
New Sulphon Dark Brown
Greys: Sulphon Black
Blacks: Jet Black G, R
Sulphon Cyanine Black B, 2B
Sulphon Black 4BT

Directions for Dyeing.

Add the well dissolved colour to the dye bath containing boiled off soap and 2% acetic acid for light shades and boiled off soap and 5% acetic acid for dark shades. Dye for 1 hour at 195° Faht., then rinse and scroop with acetic acid. 5—10% acetate of ammonia or 20—30% Glauber's salt crystals can be employed instead of boiled off soap liquor and acetic acid. If the bath is not exhausted add a little more acetic acid.

Jet Blacks are dyed best for 1 hour with the addition of 10% acetic acid, commencing luke warm and raising the temperature up to 195° Faht. When dyed, rinse well and scroop with 5—10% acetic acid.

228. **Sulphon colours** which when **dyed** on **silk** are **fast to alkali** (resisting 20% ammonia):

Reds: Anthracene Red (almost good)
Greens: Alizarine Green D, SS (almost good)
Blues: Brilliant Sulphon Azurine R
Sulphon Azurine D
Sulphon Cyanine G, GR extra, 3R, 5R extra

* These colours can be dyed in combination with the Benzidine dyestuffs stated on page 296/8.

Blacks: Jet Black G, R
Sulphon Cyanine Black B, 2B
Sulphon Black 4BT

229. **Sulphon colours,** which when **dyed** on **silk** are **fast to water:**

Greens: Alizarine Green D, SS
Blues: Sulphon Azurine D
Blacks: Sulphon Cyanine Black 2B

230. **Sulphon colours** which when **dyed** on **silk** are **fast to milling:**

Reds: Anthracene Red (best after-chromed)
Greens: Alizarine Green D
Blues: Sulphon Azurine D
Sulphon Cyanine G, GR extra, 3R, 5R extra

231. **Sulphon colours,** which when **dyed** on **silk** are distinguished for their good **fastness to light:**

Reds: Anthracene Red
Greens: Alizarine Green D
Blues: Sulphon Azurine D (in dark shades)
Sulphon Cyanine G, GR extra, 3R, 5R extra
Blacks: Sulphon Cyanine Black B, 2B
Sulphon Black 4BT

232. **Sulphon colours** which when **dyed** on **silk** are **dischargeable** with **zinc powder** and **bisulphite:**

Reds: Anthracene Red
Greens: Alizarine Green D, SS
Blues: Brilliant Sulphon Azurine R
Sulphon Azurine D (yellowish)
Sulphon Cyanine G, GR extra, 3R, 5R extra

233. **Katigen colours** (sulphide colours) adapted for dyeing silk:

Greens: Katigen Green 2B
Katigen Olive G, GN
Blues: Katigen Indigo B extra, R extra
Browns: Katigen Brown V extra
Katigen Yellow Brown GG, GR extra
Katigen Black Brown N, N extra conc.
Greys: Katigen Black SW, TG
Blacks: Katigen Black TG

Although the Katigen colours have no particular affinity fo the silk fibre fashionable shades of excellent fastness to light and soaping can be obtained with them.

When dyed at a low temperature the lustre and elasticity of the silk fibre is not affected to any great extent. The volume of dye liquor should be 30—40 : 1 of goods, and the temperature of the dye bath should never get above 100—120° Faht. Dissolve the colour in the usual manner with the requisite quantity of sulphide of soda in a little boiling water and add the colour solution to the dye bath containing soft water. Enter the well wet out silk, and dye in the usual manner for 1 hour at the temperature stated above. When dyed, rinse well, soap hot and then scroop with 8—10% acetic acid or 3—5% tartaric acid.

234. The following **acid** and **slightly acid** dyeing **colours** are adapted for the **dyeing** of **silk weighted** with perchloride of tin:

Reds: Acid Magenta
Azo Eosine
Brilliant Croceine 3B
Carmoisine B
Cloth Red B, G
Cochineal Scarlet PS
Croceine Scarlet R—10B
Double Ponceau 1R—4R
Eosine S extra bluish, I bluish
Fast Red A, BT
Imperial Scarlet 1B, 3B
Rhodamine B, G, 4G, B extra, G extra

Oranges: Croceine Orange G, R
Mandarine G
Orange IIB, RO

Yellows: Indian Yellow G, R
Fast Light Yellow G, 3G
New Yellow extra
Quinoline Yellow

Greens: Acid Green extra, BB extra, 3B, GB extra, GG extra, G extra, 6B, BBN extra in powder and the liquid brands
Alizarine Green CG extra and CE in paste and in powder)
Brilliant Acid Green 6B

Blues: Brilliant Blue extra greenish

Blues: Fast Blue greenish
Induline B
New Victoria Blue B
Night Blue extra greenish
Silk Blue BES
Soluble Blue greenish I, reddish I
Sulphon Acid Blue B, G, R
Victoria Blue B
Wool Blue N extra, R extra

Violets: Acid Violet 4B extra, 5B, 8B extra, 4RS, 6BN, R extra in powder, 5B liquid, HW
Alkali Violet LR
Azo Acid Violet R extra
Fast Acid Violet 10B

Greys: Nigrosine B, G

Blacks: Naphthaline Acid Black 4B
Victoria Black B, G, 5G

A) Weighting of silk.

Silk can be weighted in various ways either before or after degumming, or before or after or during the dye process. The object of weighting is to compensate for the loss of weight sustained in degumming or on the other hand to increase the weight of the goods generally.

aa) Weighting before Dyeing.

x) With Stannic Chloride (or Pink Salt).

Allow the silk to lie for 1 hour in a cold bath of stannic chloride 52° Tw., wring or squeeze out, hydro-extract and then enter a luke warm soda bath 2° Tw. for ¼ hour. Work frequently and rinse well. All these manipulations can be repeated in case an increased weighting is desired. In this way the silk can be weighted up to 50%.

Silk subjected to this weighting process once, increases 10% in weight, but in the following weighting the increase in weight is comparatively a little less. The weighted silk is then soaped for ¼ hour, rinsed well and scrooped with a little hydrochloric acid.

y) With Phosphate of tin.

(Phosphate-Silicate-Weighting.)

Enter the silk either in the natural or degummed state into a cold bath of stannic chloride 52° Tw. (or

Pink Salt), wring or squueze out, wash, hydro-extract, and then enter a bath of phosphate of soda 7° Tw. at about 140° Faht., work for ½—1 hour and rinse well. Each manipulation produces a weighting of about 20%, and it can be repeated as many times as necessary until a weighting of 100% is obtained. When rinsed, degummed silk is soaped for ¼ hour, then rinsed again and scrooped with a little hydrochloric acid. (If the silk has not been degummed, it should now be boiled off, see recipe on page 283 under No. 193).

In addition to this treatment the well rinsed and weighted silk is subjected to a third bath of silicate of soda 1½—4½° Tw. at 105° Faht. for ½—1 hour.

Some dyers work the silicate of soda bath at 140—160° Faht., wash well and then hydro-extract. The weighting obtained by one such treatment is up to 30%.

Great care and experience are necessary in weighting silk, otherwise the material is greatly affected and tendered.

bb) Weighting after Dyeing.

Dyed silk is weighted with tannic acid, sumac extract (3—9° Tw.), cutch, gambier, divi-divi, quebracho, chestnut extract, gall extract, etc. Silk, especially souple silk, absorbs tannins very greedily, and this affinity is increased by an addition of tin crystals.

cc) Weighting of Silk during the Dye Process.

Dye the silk in an acid boiled off soap bath, and a little brighter than the pattern, then add for each lb. of silk 2 lbs. of bleached sumac or Gallus extract to the hot dye bath. Work the silk in the liquor until it has cooled down to about 100° Faht., rinse well in cold water and scroop.

Remarks: Formerly silk was weighted with sugar, such as for instance beet-root or grape-sugar, etc. whereby only an increase of 10% in weight was obtained, but the method has long been rejected, as silk prepared with sugar has great susceptibility to water spots and also attracts flies and other insects. The weighting process with tungstate of soda is far better, as the colour is not affected and an increase of 15% in weight can be obtained.

A patented process has lately been recommended, which consists of weighting the silk with albumen and formaldehyde. Dissolve 10—14—18 oz. egg albumen in 9—14 pints water, dilute 3½—5—7 oz. formaldehyde 40% with 14 pints water, and mix the two solutions. Work the boiled off silk 8—10 times in this solution, wring out, allow to lie for 1 hour and run through the liquor again twice. Wring out, dry and scroop; dry again and gloss the silk, when it will be found that an increase in weight of 30—40—50% has been obtained.

Albumen can be substituted partly by caseine dissolved in borax or partly by gelatine.

B) Dyeing of weighted Silk.

The process is exactly the same as that described under No. 193 page 285.

235. **Basic colours** which are adapted for the **dyeing** of **silk weighted** with perchloride of tin:

Reds: Brilliant Rhoduline Red B
Diamond Fuchsine
Rhodamine B, G, B extra, G extra
Rhoduline Red B, G
Saffranine A, B extra, BB extra, FF extra
Oranges: Chrysoidine G, R
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Emerald Green Cryst.
Blues: Cotton Blue VI—2R
Methylene Blue BB
New Victoria Blue B
Rhoduline Sky Blue 2B
Turquoise Blue BB, G
Victoria Blue B
Violets: Rhoduline Violet
Methyl Violet 5R—7B
Browns: Bismarck Brown F, FF, M, R, R extra

236. **Colours** which when dyed on **silk weighted with perchloride of tin** are distinguished for their **good fastness to light:**

Reds: Azo Eosine
Brilliant Croceine 3 B
Cloth Red B, G
Cochineal Scarlet PS
Croceine Scarlet 1 B—10 B
Imperial Scarlet 3 B

Oranges: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange II B

Yellows: Fast Light Yellow G, 3 G

Greens: Alizarine Green CG extra and CE in paste and in powder

Blues: Cotton Blue VI—2 R
Induline B
Silk Blue BES
Soluble Blue green shade I, red shade I
Sulphon Acid Blue B, R

Violets: Alizarine Blue J R
Azo Acid Violet R extra

Greys: Nigrosine B, G

Blacks: Victoria Black B, G, 5 G

237. Colours which are adapted for the **dyeing** of **artificial silk:**

a. Basic colours
b. Benzidine colours
c. Katigen colours.

Reds: a. Brilliant Rhoduline Red B
Diamond Fuchsine
Rhodamine B, G, 4 G, 5 G, S, B extra, G extra, S extra
Rhoduline Red B, G
Saffranine BB extra, FF extra
b. Benzo Fast Pink 2 BL
Benzo Fast Red GL, L
Benzo Fast Scarlet 4 BS, GS, 5 BS, 8 BS
Benzo Purpurine 1 B, 4 B, 6 B, 10 B
Benzo Rhoduline Red B, 3 B

Reds: b. Benzo Red SG
Bordeaux extra
Brilliant Congo R
Brilliant Geranine B, 3B
Delta Purpurine 5B
Geranine G, BB
Rose Azurine B, G

Oranges: a. Chrysoidine Cryst.
b. Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange R
Pluto Orange G

Yellows: a. Auracine G
Auramine II
b. Benzo Fast Yellow 5GL
Chloramine Yellow GG, M
Chrysophenine
Direct Yellow R, R extra
Thiazole Yellow G, R

Greens: a. Brilliant Green Cryst.
Cotton Green
b. Benzo Dark Green B, GG
Benzo Green B, G
Benzo Olive
Brilliant Benzo Green B
c. Katigen Green 2B
Katigen Olive GN

Blues: a. Methylene Blue BB
New Blue R extra
New Fast Blue F
New Victoria Blue B
Victoria Blue B
Rhoduline Blue R
Rhoduline Sky Blue 2B
Turquoise Blue BB, G
b. Azo Blue
Benzo Azurine G
Benzo Blue 2B, BX
Benzo Cyanine B, 3B, R
Benzo Fast Blue BN
Benzo Indigo Blue

Blues: b. Benzo Sky Blue
Benzo Black Blue G, 5G
Brilliant Azurine B, 5G, 2R, 5R
Brilliant Benzo Blue 6B (direct and after-coppered)
Chicago Blue B
Diazo Blue Black
Diazo Black BHN
c. Katigen Indigo B extra, RL extra

Violets: a. Brilliant Rhoduline Violet R
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Methyl Violet 1B—7B, 1R—5R
b. Azo Violet
Benzo Fast Violet R
Benzo Violet R
Chloramine Violet R
Congo Corinth B, G
Heliotrope BB

Browns: a. Bismarck Brown F, M, R extra
b. Benzo Brown BR, 5R, NBX
Benzo Chrome Brown B, G, 5G, R
Diazo Brown G, R extra
Pluto Brown GG, NB, R
c. Katigen Brown V extra
Katigen Yellow Brown GG
Katigen Black Brown N, N extra conc.

Greys: a. New Fast Grey
b. Benzo Black S extra
Benzo Fast Black
Benzo Fast Grey
c. Katigen Blue Black 4B
Katigen Black SW

Blacks: a. Jute Black B
New Fast Grey
b. Benzo Fast Black
Direct Deep Black E, E extra, G, R, RW, RW extra, T, etc.
Pluto Black BS extra, 3B extra
c. Katigen Blue Black B, 4B
Katigen Black SW, SW extra, TG

Directions for Dyeing.

A) Chardonnet Silk.

(made of nitro cellulose).

a) Basic Colours.

Wet out the artificial silk carefully in water at 95—105° Faht., then dye for ¾—1 hour in a neutral bath at 85° or at the most 105° Faht. It is advisable not to add the dissolved and filtered Basic colour to the bath all at once, as the colours are liable to dye uneven. When dyeing in calcareous water a little acetic acid must be added to the neutral bath. As artificial silk in a wet state easily breaks it must never be boiled, and care has to be taken in turning the goods in the dye bath. When dyed, rinse and hydro-extract, but do not wring out. When the silk is dry give it a slight glossing.

Remarks: Concentrated soap and acid baths should not be employed.

b) Benzidine Colours.

The method of dyeing and precautions to be taken are on the whole the same as mentioned above for Basic colours, with the exception that the goods are dyed for ½—1 hour at 120—140° Faht. in a volume of dye liquor of 20 : 1 of goods with the addition of 5—20% Glauber's salt crystals (or 2½—10% common salt) and the requisite quantity of well dissolved and filtered dyestuff. For light shades it is advisable to dye with the addition of 10% Glauber's salt crystals and 5% soap.

c) Katigen Colours.

Katigen Colours are dyed in a similar manner on silk to that used for cotton dyeing, (see recipe under No. 81 page 130) dye for ¾—1 hour at 100—120° Faht. The Katigen Blues and Katigen Blacks are dissolved with the same amount of sulphide of soda the other colours with half the amount, and according to the depth of shade required with the addition of 5—25% Glauber's salt crystals (2½—12½% common salt) and 1—4% soda ash.

B) Glanzstoff

(prepared from cellulose dissolved in ammoniacal copper sulphate solution).

a) Basic Colours.

Light shades can be dyed in a neutral bath in the same way as Chardonnet silk (see preceding page). Medium and dark shades are dyed best on material previously mordanted with tannic acid and tartar emetic, the same way as cotton. Work the goods in the bath containing 2—5 % tannic acid and 1 % hydrochloric acid at 120° Faht., then lift the goods, hydroextract and afterwards mordant in a fresh bath containing 1—2 % antimony salt or tartar emetic, then rinse. Prepare the dye bath with 2—3 % acetic acid, work the mordanted goods in this, then add the well dissolved and filtered colour solution in 2 or 3 portions and warm up to 85—105° Faht.

b) Benzidine Colours.

Benzidine colours are dyed on Glanzstoff in the same way as on Chardonnet silk, see page 336. The volume of dye liquor should be as short as possible.

Shades dyed in the above manner can be topped in a fresh cold bath with Basic colours and acetic acid.

c) Katigen Colours.

The method of dyeing is exactly the same as described above for Chardonnet silk.

238. The following colours are adapted for the **wax resist style** on **silk:**

Reds: New Magenta
Saffranine FF extra
Oranges: Coriphosphine O, OX, OX extra
Yellows: Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Blues: Blue 8336 (Navy Blue)
Fast Acid Blue B, B extra
Indigene F in paste
Intensive Blue
Methylene Blue BB
New Blue D
New Fast Blue F, H
Rhoduline Blue R
Rhoduline Sky Blue 2B
Silk Blue BES
Violets: Fast Acid Violet 10B

Violets: Methyl Violet 5 R—7 B
Rhoduline Heliotrope B, 3 B
Browns: Bismarck Brown R extra
Blacks: Jute Coal Black S

Recipe I for Wax Resists.

Mix:

30	oz.	or	3000	grms.	resin
7 1/2	»	»	750	»	colophony
6	»	»	600	»	yellow wax
4	»	»	400	»	stearine
1 1/2—2	pints	»	3—4	litres	rectified petroleum

For the white resists print on the above wax resist, then strew on Fuller's earth, hang the goods for 2—3 days in a warm room (65—85° Faht.) to dry, wash in cold water, dye cold for 2—4 hours in a bath containing the well dissolved and filtered Aniline colour (if necessary containing a little acetic acid) wash cold, hydro-extract, dry cold, run through benzine in order to dissolve the wax resist, hydro-extract, and dry on laths in a cold room. Only the best quality benzine should be employed, viz. from benzole and toluole and not petroleum benzine. The goods can be subsequently steamed.

After the pieces have been dyed they can be run through a cold bath of tannic acid and tartar emetic, washed cold, dried cold and the wax resist removed by benzine, then hydro-extracted and dried.

Remarks: For Navy Blues it is best to employ a combination of Saffranine, Brilliant Green crystals and Methylene Blue BB. Methyl Violet should not be used, as it may happen that in the benzine bath the colour might run.

Recipe II for Wax Resist.

Warm up in a double cased copper vessel:

87	oz.	or	8720	grms.	colophony
4	»	»	400	»	mutton dripping (cold)
9	»	»	900	»	melted bees wax previously heated up to 250° Faht. (cold)
7	»	»	700	»	white oil (spermaceti)
2 1/2—3 1/2	pints	or	5—7	litres	turpentine oil

until completely dissolved; strain the whole whilst hot and then allow to cool.

The quantity of turpentine oil stated can also be slightly increased.

Work in exactly the same manner as stated for Recipe No. 1.

Half-Silk.

239. **Benzidine colours** which dye **silk** and **cotton** with Glauber's salt and soap the **same** or **almost the same shade:**

Reds: Benzo Fast Red GL (silk yellower), L
Benzo Purpurine 1B, 4B, 6B
Benzo Rhodulin: Red B, 3B (Silk yellower)
Brilliant Geranine B, 3B
Delta Purpurine 5B
Diazo Rubine B (Dev. A)
Geranine G

Oranges: Congo Orange R
Pluto Orange G
Toluylene Orange G

Yellows: Benzo Fast Yellow 5GL
Chloramine Yellow M
Chrysamine G, R
Chrysophenine G
Thiazole Yellow G, R

Greens: Benzo Dark Green B, GG
Brilliant Benzo Green B (silk yellower)

Blues: Benzo Blue RW
Benzo Cyanine B
Benzo Fast Blue 5R

Violets: Azo Violet (silk redder)
Benzo Violet RL extra
Benzo Bordeaux 6B (silk yellower)
Chloramine Violet R
Congo Corinth B, G (silk redder)

Browns: Benzo Brown D3G extra
Benzo Chrome Brown B and 3R (silk yellower)
Pluto Brown R

Greys: Benzo Fast Black

Blacks: Diazo Black 2B (Dev. A)
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra (Dev. A and Dev. H)
Pluto Black BS extra

240. **Benzidine colours** which leave the **silk** quite **white** or almost so, **only dyeing the cotton** fibre in a bath containing **soda and soap:**

Reds: Benzo Fast Scarlet 5BS, GS, 8BS
Benzo Fast Pink 2BL

Oranges: Chloramine Orange G
Mikado Orange

Yellows: Chloramine Yellow GG
Direct Yellow R, R extra
Blues: Benzo Blue 2B, 3B
Benzo Chrome Black Blue B (almost white)
Benzo Sky Blue, concentrated
Brilliant Azurine B, 5G, 2R, 5R
Brilliant Benzo Blue 6B
Chicago Blue B
Diazo Black BHN
Diazo Blue Black
Greys: Pluto Black G (Dev. H)
Blacks: Diazo Black BHN, BHN extra (Dev. H)
Diazo Fast Black G (Dev. H)
Pluto Black F extra

241. **Benzidine colours** which dye the **cotton fuller** than the **silk** in a bath containing Glauber's salt and soap:

Reds Benzo Fast Pink 2BL
Benzo Fast Scarlet 4BS, 5BS, 8BS, GS
Benzo Purpurine 10B
Brill ant Congo R
Oranges: Benzo Fast Orange S
Chloramine Orange G
Mikado Orange G
Yellows: Chloramine Yellow GG, HW
Direct Yellow R, R extra
Blues: Benzo Azurine G
Benzo Blue 2B, 3B
Benzo Chrome Black Blue B
Benzo Cyanine 3B
Benzo Fast Blue B, BN, G, R
Benzo Sky Blue, conc.
Brilliant Azurine B, 2R, 5R, 5G
Brilliant Benzo Blue 6B
Chicago Blue B
Diazo Blue Black
Diazo Black BHN
Violets: Benzo Fast Violet R
Benzo Violet R (silk redder), RL extra
Browns: Brown TR 720
Greys: Pluto Black G
Blacks: Diazo Fast Black G (Dev. H)
Diazo Black BHN, BHN extra (Dev. A)
Pluto Black F extra

Directions for Dyeing Benzidine Colours.

a) In a soap bath containing Glauber's salt.

Add the well dissolved and filtered Benzidine colour to the dye bath containing 20% Glauber's salt crystals (10% calcined) and 5—10% olive oil soap. Dye for ¾—1 hour at 100—200° Faht., wash and then scroop with a little acetic acid.

b) In a soap bath containing soda.

For No. 240.

Add the well dissolved and filtered Benzidine colour to the dye bath containing 2% soda ash and 10—20% olive oil soap. Dye for ¾—1 hour at 100—200° Faht., wash and then scroop with a little acetic acid.

Remarks: When using calcareous water the dye bath must be first boiled up with soap or soda, and the sebacic lime rising on the surface of the water must be carefully removed.

The dyed shades are often topped with Basic colours in a luke warm bath at 85° Faht., containing ⅛—¾ noggin acetic acid per 7½ gallons liquor or also with easily level dyeing acid colours. (See under No. 194, page 286)

242. **Benzidine colours,** which when dyed on **half-silk** can be **discharged** with **zinc powder and bisulphite:**

Reds: Benzo Fast Scarlet 4BS, GS (becomes slightly yellow)
Benzo Fast Red GL
Benzo Rhoduline Red B, 3B
Benzo Purpurine 1B, 4B, 10B
Brilliant Congo R
Brilliant Geranine B, 3B
Delta Purpurine 5B
Geranine G

Oranges: Benzo Fast Orange S
Congo Orange R
Chloramine Orange G
Pluto Orange G
Toluylene Orange G

Yellows: Chrysamine G, R
Chrysophenine G

Greens: Benzo Dark Green B, GG

Blues: Benzo Azurine G

Blues: Benzo Blue 2B, 3B, RW
Benzo Cyanine B, 3B
Benzo Fast Blue B, BN, G, R
Benzo Sky Blue, conc.
Brilliant Azurine B, 5G
Brilliant Benzo Blue 6B
Diazo Blue Black

Violets: Azo Violet
Benzo Bordeaux 6B
Benzo Fast Violet R
Benzo Violet R, RL extra
Chloramine Violet R
Congo Corinth B, G

Browns: Benzo Chrome Brown B, R
Pluto Brown R

Greys: Diazo Black BHN (Dev. A)
Pluto Black G

Blacks: Diazo Black BHN, BHN extra (Dev. A)
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra
Pluto Black BS extra, F extra

The recipe for discharging is exactly the same as stated under No. 26 page 50 for Benzidine colours.

243. **Colours** (not dischargeable), adaptable in combination with **zinc powder** for **colour dischargeing half-silk** dyed with **dischargeable colours:**

Reds: Brilliant Rhoduline Red BD in paste
Rhoduline Red G in powder, GD in paste
Saffranine FF extra, B extra, BB extra

Blues: Methylene Blue BB

The recipe for discharging is exactly the same as stated under No. 75 page 126.

243a. **Benzidine Colours** which when dyed on **half-silk** are dischargeable with Hydrosulphite NF.

Reds: Benzo Fast Red GL (fairly easily) L (easily)
Benzo Fast Scarlet GS (readily enough)
Benzo Rhoduline Red B (easily)
Brilliant Geranine B (yellowish), 3B (easily)
Ge anine G (easily)

Oranges: Benzo Fast Orange S (readily enough)

Yellows: Chrysamine G and R (readily enough)
Chrysophenine G (easily)

Greens: Benzo Dark Green B and GG (easily)

Greens: Brilliant Benzo Green B
Blues: Benzo Azurine G (easily)
Benzo Blue RW (fairly easily)
Benzo Sky Blue (fairly easily)
Brilliant Azurine B (easily), 2R (fairly easily), 5R (reddish)
Diazo Indigo Blue 2RL, 4RL (Dev. A) (fairly easily)
Benzo Chrome Black Blue B (fairly easily)
Violets: Azo Violet (easily)
Benzo Bordeaux 6B (fairly easily)
Benzo Violet R (easily)
Chloramine Violet R (yellowish)
Browns: Benzo Brown D3G extra (easily)
Benzo Chrome Brown B, 3R (easily)
Pluto Brown R (easily)
Greys: Pluto Black G (easily)
Blacks: Benzo Fast Black (fairly easily)
Direct Deep Black E, E extra (Dev. A) and (Dev. H) (fairly easily), EW, EW extra (Dev. A) and (Dev. H) (fairly easily), RW, RW extra (Dev. A) and (Dev. H) (fairly easily)
Pluto Black BS extra (easily), F extra (fairly easily)

244. **Benzidine colours** which can be employed for the **printing of half-silk:**

Reds: Benzo Fast Red L, GL
Benzo Fast Scarlet 4BS, GS
Benzo Purpurine 1B
Benzo Rhoduline Red B, 3B
Benzo Red SG
Brilliant Geranine 3B, B
Brilliant Congo R
Geranine BB, G
Rose Azurine B, G
Oranges: Benzo Orange R
Congo Orange G, R
Pluto Orange G
Yellows: Benzo Fast Yellow 5GL
Chloramine Yellow GG, M
Chrysamine G, R
Chrysophenine G

Yellows: Thiazole Yellow R, G
Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Blues: Benzo Sky Blue, conc.
Brilliant Azurine 2R, 5R
Brilliant Benzo Blue 6B
Diazo Fast Black 3B, G
Violets: Benzo Fast Violet R
Benzo Violet R, RL extra
Congo Corinth B, G
Chloramine Violet R
Heliotrope BB
Browns: Benzo Brown RC, D3G extra
Benzo Chrome Brown BS
Cotton Brown IV
Pluto Brown GG, NB, R
Greys: Direct Blue Black 2B
Pluto Black FR, CR
Blacks: Pluto Black BS extra, CR, L extra

The recipe for printing is the same as given under No. 203 page 300 for silk.

245. **Benzidine colours** which when dyed on **mercerised cotton,** are **fast to water** by the side of white **silk:**

Reds: Benzo Fast Scarlet 4BS
Yellows: Chloramine Yellow M
Chrysamine G
Direct Yellow R, R extra
Thiazole Yellow G, R
Greens: Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B
Blues: Benzo Chrome Black Blue B
Benzo Indigo Blue
Benzo Sky Blue 4B

246. **Basic colours** which can be employed for **printing half-silk:**

Reds: Brilliant Rhoduline Red BD in paste, B in powder
Diamond Fuchsine
Pyronine G
Rhodamine B, G, 5G, B extra, G extra
Saffranine FF extra, A, B extra, BB extra

Oranges: Coriphosphine O, OX, OX extra
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Methyl Green
Emerald Green Cryst.
Blues: Blue 8336 (Navy Blue)
Methylene Blue BB
New Fast Blue F
New Victoria Blue B
Rhoduline Blue R
Rhoduline Sky Blue BB
Turquoise Blue BB, G
Violets: Brilliant Rhoduline Purple R
Methyl Violet 5R—7B
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Browns: Bismarck Brown F, FF, R extra, M
Greys: New Fast Grey
Blacks: Jute Black B
Jute Coal Black S

General Recipe for Printing.

Dissolve:

1 1/2 oz.	or 15 grms.	**Basic colour**	in
1 pint	» 195 »	water	and
1/2 »	» 100 »	acetic acid 9° Tw. (30%)	
		thicken with	
3 »	» 600 »	gum solution 1 : 1,	add
1 4/5 noggs.	» 90 »	acetic acid tannic acid solution 1:1	
	1000 grms.		

Steam for 1 hour without pressure, pass through a cold tartar emetic bath (1 3/5 oz. per gallon), wash, soap slightly for 5 minutes at 85° Faht. wash and dry.

247. **Mordant colours** which are **suited** for **printing half-silk** with a **chrome mordant:**

Reds: Brilliant Chrome Red in paste
Chrome Red in paste and in powder
Oranges: Diamond Orange in paste
Yellows: Alizarine Yellow GG paste
Anthracene Yellow in paste, C
Fast Printing Yellow 3G powder

Yellows: Chrome Yellow D in powder, R extra in paste
Diamond Flavine G in paste
Diamond Yellow G in paste

Greens: Alizarine Green CG extra in paste
Alizarine Green V in paste and in powder
Alizarine Green S and SW in paste
Chrome Green in powder

Blues: Alizarine Blue S, SR, S extra, SR extra in paste and in powder
Alizarine Blue BAG and BAR in paste, SD in powder
Alizarine Blue BR3G in paste
Chrome Blue in paste
Celestine Blue B in powder
Gallamine Blue in paste

Violets: Alizarine BXP in paste
Chrome Violet in paste
Galleine in paste

Browns: Alizarine Orange G, GG, R, RP in paste
Alizarine Red IIAB in paste, etc.
Anthracene Brown G, GG, R in paste

Blacks: Alizarine Black 3B in paste and in powder
Alizarine Black IA in paste and in powder

The recipe for printing Chrome mordant colours on half-silk is exactly the same as stated under No. 222, page 320 and 321 for the printing of Mordant colours on silk cloth.

248. **Acid colours** which when dyeing **half-silk** (in light shades), leave the **cotton** almost **white**, only dyeing the **silk**. (After dyeing chlore slightly if necessary):

Reds: *Acid Magenta
Azo Fuchsine G
Azo Crimson S
Brilliant Croceine 3B
Croceine Scarlet 1B—10B
Metanil Red 3B, 3B extra

Oranges: Croceine Orange G, R
Fast Light Orange G
Orange IIB

Yellows: Fast Light Yellow G, 3G*

*Those colours marked with an asterisk should be only slightly chlored.

Yellows: *Naphtole Yellow S
*Tartrazine
Greens: Acid Green BB extra, 6B, BBN extra, liquid quintuple, G extra, GG extra, GB extra
Brilliant Acid Green 6B
Fast Green CR, W, bluish, extra, extra bluish
Blues: New Patent Blue B, 4B, GA*
Wool Blue N extra*, R extra*, SR extra
Violets: Acid Violet 6B, 4B extra, 4RS, 5B, 7B, 8B extra, R extra, HW in powder, 5B liquid
Alkali Violet LR
Fast Acid Violet 10B
Greys: *Naphtole Black 2B
Nigrosine B
Victoria Black B*, G*, 5G*

Dye half silk goods in a strongly acetic acid bath (10—20% acetic acid) for 1 hour at the boil, wash well and if necessary chlore slightly to produce a fine white on the cotton. The method is best adapted for the production of light shades.

249. **Acid** and **Basic colours** adapted for **shading half-silk** in a bath containing acetic acid:

a) for Silk.

Reds: Acid Magenta
Azo Eosine
Bordeaux extra
Brilliant Croceine 3B
Croceine Scarlet R—10B
Fast Red A
Imperial Scarlet B, 3B
Metanil Red 3B
Orange R
Rhodamine B, B extra, G, 4G, 5G, G extra
Oranges: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB

* Those colours marked with an asterisk should be only slightly chlored.

Yellows: Fast Light Yellow G
Indian Yellow G, R
Naphtole Yellow S
Quinoline Yellow
Tartrazine

Greens: Acid Green B B extra, 6B, B BN extra, liquid quintuple, 3 B, G extra, G G extra, G B extra and liquid

Blues: Brilliant Blue extra greenish
Brilliant Wool Blue B extra
Cotton Blue RR—VI
Induline B
New Patent Blue B, 4B, G A
New Victoria Blue B
Silk Blue B ES
Soluble Blue red shade I, green shade I
Victoria Blue B
Wool Blue N extra, R extra, S R extra

Violets: Acid Violet 6BN, 4B extra, 6BN extra, 4RS, 5B, 7B, 8B extra, R extra, HW in powder, 5B liquid
Alkali Violet LR
Azo Acid Violet 4R, R extra
Fast Acid Violet 10B

Greys: Nigrosine B, G

Blacks: Naphthaline Acid Black 4B
Naphtylamine Black 4B
Silk Black
Victoria Black B

b) for Cotton (and Silk).

Reds: Brilliant Rhoduline Red B
Diamond Fuchsine
Crimson 16
Rhodamine B, B extra, G, 4G, 5G, G extra
Rhoduline Red B, G
Saffranine F F extra

Oranges: Chrysoidine G

Yellows: Auracine G
Auramine O, I, II, conc.

Greens: Brilliant Green Cryst.

Greens: Methylene Green B
Blues: Methylene Blue BB
New Blue D
New Victoria Blue B
Rhoduline Blue R
Rhoduline Sky Blue BB
Turquoise Blue BB, G
Victoria Blue B
Violets: Brilliant Rhoduline Purple R
Methyl Violet 1B—5R
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Browns: Bismarck Brown F, FF, M, R, R extra
Greys: New Fast Grey
Blacks: Jute Black B

Half-silk dyed with Benzidine colours is shaded in a fresh cold bath containing 5% acetic acid when employing Acid colours, and with 3% acetic acid when using Basic colours. The colours must be dissolved thoroughly and the solution carefully filtered.

250. **Katigen colours** (sulphide colours) adapted for **dyeing half-silk:**

Greens: Katigen Green 2B
Katigen Olive G, GN
Blues: Katigen Chrome Blue 5G
Browns: Katigen Brown V extra
Katigen Yellow Brown GG
Katigen Black Brown N, N extra conc.
Greys: Katigen Black SW, TG
Blacks: Katigen Black SW, TG

The method given under No. 233, page 328 for the dyeing of Katigen colours on silk can also be applied for half-silk; it is advisable to wet out the goods well before dyeing and to employ 5—10% olive oil soap to produce level shades. For dark shades Glauber's salt can also be used: when dyed, the goods should be rinsed well and soaped, then scrooped with acetic acid.

For Blacks the following method has been found serviceable. Dissolve the colour with about $^{2}/_{3}$rds. the amount of sulphide of soda, add to the dye bath half the amount of bisulphate of soda as colour employed, and dye at the boil.

Add to the boiling bath the colour solution together with the quantity of sodium hydrosulphide stated below (Patented directions for dyeing), then add the Glauber's salt and dye at the boil.

General Recipe for Dyeing.

3—23 % Katigen Colour
0.3— 6 % sodium hydrosulphide
5—40 % Glaubers salt crystals.

Silk-Unions.

(Wool and Silk.)

251. The following **colours** dye **silk-unions** in a boiling bath containing Glauber's salt and sulphuric acid (almost) a **uniform shade:**

Reds: Bordeaux extra
Fast Red A
Metanil Red 3B, 3B extra

Yellows: Fast Light Yellow G
Quinoline Yellow G (almost uniformly)
Indian Yellow G

Greens: Brilliant Acid Green 6B
Fast Green bluish, extra bluish, CR
Fast Light Green in powder and quintuple liquid

Blues: *Alkali Blue 7B—6R extra
†Brilliant Wool Blue B extra, G extra
†Wool Blue R extra, N extra, SR extra

Violets: Alkali Violet LR
Fast Acid Violet 10B
Acid Violet 4B extra, 5B, 8B extra, BW, 5B liquid, HW, 7B

Blacks: Gloria Black B, N
Naphthaline Acid Black 4B
Sulphon Cyanine Black 22768
Victoria Black B, G, 5G

Directions for Dyeing.

Silk-unions (wool and silk) are dyed for 1 hour in a hot to boiling bath containing the well dissolved Acid colour and the addition of 5—10% bisulphate of soda, or 5—10% Glauber's salt crystals and 1½—3% sulphuric acid of the weight of the goods; afterwards rinse well, wash and dry.

If the shade on the silk is not up to pattern it can be shaded with Basic colour. Allow the bath to cool down, add the dissolved Basic colour, and work without steam for ¼ hour, rinse well, wash and dry.

Alkali Blues are dyed with the addition of 10% borax for 1 hour at 180—195 °Faht., then rinsed and acidulated in a fresh luke warm bath with 5% sulphuric acid, washed and dried.

* Those colours marked with an asterisk are dyed at the boil with the addition of borax and afterwards acidulated. (See remarks on next page.)

Those colours marked with a dagger must be dyed at the boil in order to dye the wool a full shade.

252. **Basic colours** which dye **silk-unions** at the boil in a neutral bath (almost) a **uniform shade:**

Reds: Brilliant Rhoduline Red B
Diamond Fuchsine
Rhoduline Red B, G
Saffranine FF extra
Oranges: Chrysoidine Cryst.
Yellows: Auracine G
Auramine O, I, II, concentrated
Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Emerald Green Cryst.
Methylene Green B
Blues: New Victoria Blue B
Rhoduline Sky Blue BB
Turquoise Blue BB, G
Violets: Methyl Violet 7B – 5R
Rhoduline Heliotrope B, 3B
Rhoduline Violet

Directions for Dyeing.

Dye in a neutral boiling bath containing the previously well dissolved Basic colour.

Remarks: Basic colours, with the exception of Diamond Fuchsine and Chrysoidine, dye the silk much fuller than the wool in an acid bath (3 % sulphuric acid and 10 % Glauber's salt crystals).

253. The following **Colours** dye **silk-unions** in a bath containing Glauber's salt or Glauber's salt and acetic acid (almost) a **uniform shade:**

Those colours marked with a dagger require an addition of acetic acid.

Reds: †*Anthracene Red
†Benzo Fast Red L, GL
†*Benzo Fast Scarlet GS, 4BS, 5BS, 8BS
†Brilliant Congo R
†Benzo Rhoduline Red B
†Delta Purpurine 5B
†Geranine G
Oranges: †Benzo Fast Orange S
Congo Orange R
*Pluto Orange G
Yellows: Chloramine Yellow M

Yellows: Chrysophenine G
Greens: *Benzo Dark Green B, G G
†*Benzo Green B B, G
Brilliant Benzo Green B
Blues: †Benzo Sky Blue, conc.
*Brilliant Benzo Blue 6B
Diazo Blue Black
Sulphon Cyanine G, G R extra, 3 R, 5 R extra
Violets: †Benzo Violet R, R L extra
Chloramine Violet R
Browns: †*Benzo Chrome Brown B, 5 G, R
Pluto Brown R
Greys: *Benzo Fast Black
Diazo Blue Black
Blacks: *Direct Deep Black E, E extra, R, R W, E W, E W extra, R W extra
†* Silk Black

Silk-unions are dyed at the boil with the requisite quantity of well dissolved colour with the addition of 10—40% Glauber's salt crystals, or 10—20% Glauber's salt crystals and 2 4% acetic acid; those colours marked with an asterisk must be boiled until both fibres are dyed about the same depth of shade.

Remarks: Should the wool be too light, add 1—2% acetic acid, boil up again, rinse well and dry.

254. **Acid colours** which when dyed on **silk-unions** in a boiling bath containing acetic acid **leave the silk almost untinged:**

Reds: Acid Magenta (in small quantities for shading)
Azo Cochineal
Azo Crimson L, S
Azo Fuchsine B, 6B, G
Cochineal Scarlet PS
Fast Red NS
Yellows: Fast Yellow extra
Fast Light Yellow 3 G (fairly good)
Metanil Yellow, conc. (in small quantities for shading)
Naphtole Yellow S
Tartrazine
Blues: Alizarine Blue SAP, SAC, SAE
Violets: Victoria Violet 4 BS
Blacks: Azo Fuchsine G (bichrome)

Dye silk-unions for 1 hour at the boil with the requisite quantity of well dissolved colour and the addition of 20% acetic acid, rinse well and treat the goods for ½ hour at 100° Faht. in wheat bran, whereby the silk becomes clear. Afterwards rinse well, and then scroop with 5% acetic acid.

Remarks: The white silk can be dyed if required with Basic or Acid colours for ½ hour at 75—85° Faht. with the addition of 3—5% acetic acid.

The red shade on the wool dyed with Azo Fuchsine G can be turned into Black by boiling for ½ hour with 3% bichrome. After the goods have been rinsed well, treat with wheat bran, rinse again, acidulate, and if required the white silk can be dyed with Acid colours as described above.

255. **Colours** which when dyed on **silk-unions,** dye the **silk well** in a **cold acetic acid bath,** leaving the **wool** scarcely dyed or only tinged.

Reds: Acid Magenta
Brilliant Rhoduline Red B
Rhodamine B, B extra, G, G extra
Rhoduline Red B, G
Saffranine FF extra (fairly good)

Yellows: Auramine O, I, II, conc.

Greens: Brilliant Green crystals
China Green crystals
Cotton Green

Blues: Methylene Blue BB
New Blue D
Rhoduline Blue R (fairly good)
Rhoduline Sky Blue BB
Turquoise Blue BB, G

Violets: Acid Violet 4B extra, 5B, 7B, 8B extra, 6BN, 7BN extra. HW, R extra, 3R
Alkali Violet LR (fairly good)
Rhoduline Heliotrope B, 3B
Rhoduline Violet

Browns: Bismarck Brown F, R

Blacks: Jute Coal Black S (fairly good)

Dye silk-unions for ½—¾ hour in a cold bath with the addition of 5% acetic acid, whereby the silk is dyed a full shade, the wool being only slightly tinged. Afterwards rinse well and dry.

256. **Acid wool colours** which are adapted for the **printing** of **silk-unions**:

Reds: Azo Crimson S (fairly good)
Carmoisine B
Cochineal Scarlet PS (fairly good)
Double Ponceau 1R—4R
Eosine S extra bluish
Metanil Red 3B, 3B extra
Rhodamine B, G, S, 4G and 5G

Oranges: Eosine S extra yellowish
Orange IIB, RO
Fast Light Orange G

Yellows: Quinoline Yellow
Fast Yellow extra
Naphtole Yellow S
New Yellow extra
Tartrazine

Greens: Acid Green GB extra
Brilliant Acid Green 6B
Fast Green CR, bluish,
Wool Green BS

Blues: Alizarine Blue BRG, BR3G
Alkali Blue 2B—7B, 6R extra
Brilliant Wool Blue G extra
Fast Acid Blue B, B extra
Induline B
Intensive Blue
New Patent Blue B, 4B, GA
Silk Blue BES
Sulphon Acid Blue B

Violets: Acid Violet 4B extra, 1R extra, 3R, 5B, 7B, BW
Azo Acid Violet R extra
Fast Acid Violet 10B

Browns: Alizarine Red Brown R

Blacks: Wool Printing Black 21038

General Recipe for Printing.

Boil:

2	oz.	or 20	grms.	**Acid colour**
1 1/2	pints	» 300	»	British gum and
2 9/10	»	» 580	»	water, then add
1/2	»	» 100	»	acetic acid 9° Tw. (30%)
		1000	grms.	

Steam the printed silk-union for 1 hour without pressure, wash and dry.

257. **Benzidine colours** which are adapted for the **printing** of **silk-unions:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Red GL
Benzo Fast Scarlet 4BS
Benzo Purpurine 1B, 6B
Benzo Red SG
Brilliant Congo R
Brilliant Geranine B, 3B
Brilliant Purpurine R
Delta Purpurine 5B
Geranine G, BB
Rose Azurine B, G

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Trona Red GG

Yellows: Benzo Fast Yellow 5GL
Chloramine Yellow GG, M
Chrysamine G, R
Chrysophenine G
Direct Yellow R, R extra
Thiazole Yellow G, R

Greens: Benzo Dark Green B, GG
Benzo Green BB, G

Blues: Benzo Blue BX, RW, 2B, 3B
Benzo Sky Blue, concentrated
Brilliant Azurine 2R, 5R (fairly good)
Brilliant Benzo Blue 6B

Violets: Benzo Fast Violet R
Benzo Violet R
Chloramine Violet R

Violets: Congo Corinth B, G
Heliotrope BB
Browns: Cotton Brown IV

General Recipe for Printing.

Boil:

2	oz.	or 20	grms.	**Benzidine colour**
$1\frac{1}{2}$	pints	» 300	»	British gum and
$3\frac{1}{4}$	»	» 660	»	water, then add
2	oz.	» 20	»	phosphate of soda

1000 grms.

Steam the printed silk-union for 1 hour without pressure, wash and dry.

258. **Benzidine colours,** which when **dyed** on **silk-unions** can be discharged with **tin crystals** or **zinc powder:**

Reds: Benzo Fast Red GL
Benzo Rhoduline Red B
Brilliant Congo R
Delta Purpurine 5B
Geranine G
Oranges: Benzo Fast Orange S
Congo Orange R
Pluto Orange G
Yellows: Chrysophenine G
Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Blues: Benzo Sky Blue, conc.
Brilliant Benzo Blue 6B
Diazo Blue Black
Violets: Benzo Violet R, RL extra
Chloramine Violet R
Browns: Benzo Chrome Brown B, G, R
Bordeaux extra
Pluto Brown R
Greys: Benzo Fast Black
Diazo Blue Black
Blacks: Direct Deep Black E, E extra, EW, EW extra, RW, RW extra,

The recipe for discharging with tin crystals is exactly the same as stated under No. 117, page 185, and with zinc powder the same as given under No. 26, page 50 and under No. 119, page 189.

259. **Acid colours** which when **dyed** on **silk-unions** can be discharged with **zinc powder** and **bisulphite of soda** or **tin crystals:**

Reds: Azo Bordeaux
Azo Cochineal
Azo Crimson L, S
Azo Fuchsine B, 6B, G
Brilliant Croceine 3B
Croceine Scarlet R—10B
Fast Red A, NS
Oranges: Orange IIB
Yellows: Fast Yellow extra
Violets: Azo Acid Violet R extra
Victoria Violet 4BS
Blacks: Victoria Black B

The recipe for discharging with zinc powder is exactly the same as stated under No. 26, page 50 and under No. 119, page 189, and with tin crystals the same as given under No. 117, page 185.

260. **Colours** (undischargeable) which are adapted with **tin crystals** for **colour discharging silk-unions** dyed with dischargeable colours:

Reds: Eosine S extra bluish
Oranges: Eosine S extra yellowish
Yellows: Quinoline Yellow
Greens: Acid Green extra, BB extra, 3B, 6B, BBN extra, G extra, GB extra, GG extra
Brilliant Acid Green 6B
Fast Green bluish, extra bluish
Fast Light Green in powder and liquid quintuple
New Acid Green GX, 3BX
Blues: Fast Acid Blue B, B extra
Intensive Blue
Wool Blue N extra, R extra
Violets: Acid Violet 3B extra, 4B extra, 4BG extra, 5B, 6B, 6BN, 8B extra, HW
Fast Acid Violet 10B

General Recipe for Discharging.

Dissolve:

3 oz.	or 30 grms.	**Undischargeable colour** in
3 2/5 noggs.	» 170 »	water, thicken with
3 pints	» 600 »	gum solution 1 : 1, add
1 1/4 lbs.	» 200 »	tin crystals
	1000 grms.	

If necessary some acetate of soda can also be added to the discharge paste.

Silk-unions dyed with dischargeable colours (See under No. 258, page 361), are printed with the above discharge paste, steamed for 1/2 hour without pressure, washed and dried.

261. **Colours** (not dischargeable) which are adapted with **zinc powder** for **colour discharging silk-unions** dyed with dischargeable colours:

Yellows: Quinoline Yellow
Blues: Induline B
Methylene Blue BB
Violets: Rhoduline Violet

Recipe for Colour Discharging.

General Recipe for Discharging.

Stir up:

1 1/2 — 3 oz.	or 15—30 grms.	**Undischargeable colour** with
1 7/10 — 1 2/5 noggs.	» 85—70 »	water, thicken with
1 1/2 pints	» 300 »	gum solution 1 : 1, warm up, add
2 lbs.	» 320 »	zinc powder best quality, and then add slowly whilst cooling down with ice
1 2/5 pints	» 280 »	sodium bisulphite 52° Tw.
	1000 grms.	

Print the silk-unions dyed with dischargeable colours with the above discharge paste, steam for 1 hour without pressure, wash and dry.

262. **Basic colours** adapted for **printing silk-unions:**

Reds: Brilliant Rhoduline Red BD paste
Rhoduline Red B, G

Reds: Saffranine A, B extra, BB extra, FF extra,
Oranges: Coriphosphine O, OX, OX extra
Yellows: Auracine G
Auramine O, I, II conc.
Greens: Brilliant Green Crystals
China Green Crystals
Emerald Green Crystals
Blues: New Victoria Blue B
Rhoduline Blue R, GG extra
Turquoise Blue BB, G
Violets: Brilliant Rhoduline Purple R
Methyl Violet 1B—7B, RB, 1R—5R
Rhoduline Heliotrope B, 3B
Rhoduline Violet

General Recipe for Printing.

Boil:

3	oz.	or 30 grms.	**Basic colour** with
1/2	pint	» 100 »	acetic acid 9° Tw. (30%)
1 7/8	»	» 390 »	water and
1 1/2	»	» 300 »	British gum, add cold
3 1/2	noggs.	» 180 »	acetic acid tannic acid solution 1 : 1

1000 grms.

Most Basic colours can be printed acid direct without any tannic acid. The addition of tannic acid renders the prints as a rule faster to washing, but in many cases duller in shade, sometimes producing much greener tones, e. g. Victoria Blue B, New Victoria Blue B, Turquoise Blue BB and G, etc.

Steam the printed cloth for 1 hour without pressure, if necessary run through a bath of tartar emetic, wash and dry, (if necessary prior to this, soap slightly).

263. **Colours** which when dyed on **wool** are **fast to water,** not bleeding on to white **silk:**

Reds: Anthracene Red
Benzo Purpurine 4B, 10B
Brilliant Congo R
Brilliant Purpurine R
Congo Red
Delta Purpurine 5B
Hessian Purple N
Oranges: Chloramine Orange G
Yellows: Chrysamine G

Yellows: Chrysophenine G
Thiazole Yellow G, R
Greens: *Acid Green BB extra, *GG extra
Benzo Dark Green B, GG
Benzo Green BB, G
Fast Green bluish, extra bluish
Fast Light Green powder and liquid quintuple
*Parrot Green
Blues: *Brilliant Blue extra greenish
Brilliant Sulphon Azurine R
Fast Blue greenish
*Soluble Blue I green shade
Sulphon Cyanine G, GR extra

*The shade of those colours marked with an asterisk becomes lighter.

Linen and Half-Linen.

264. **Benzidine colours** which are adapted for the dyeing of **linen** and **half-linen:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Scarlet 4BS, 5BS, 8BS, GS
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Fast Red L, GL
Benzo Rhoduline Red B, 3B
Benzo Red SG
Brilliant Congo R
Brilliant Geranine B, 3B
Brilliant Purpurine R
Congo Red, 4R
Congo Rubine
Delta Purpurine 5B, 7B
Geranine G, BB
Hessian Purple N,
Rose Azurine B, G

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Pluto Orange G
Toluylene Orange G

Yellows: Brilliant Yellow
Chloramine Yellow GG, M
Chrysamine G, R
Chrysophenine G
Curcumine S
Direct Yellow R, R extra
Thiazole Yellow R, G

Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B

Blues: Azo Blue
Benzo Azurine G, 3G, R
Benzo Black Blue G, 5G, R
Benzo Blue 2B, 3B, BX, RW, 2R, 4R
Benzo Chrome Black Blue B
Benzo Cyanine B, 3B, R
Benzo Fast Blue B, BN, G, R
Benzo Indigo Blue

Blues: Benzo Navy Blue B
Benzo Sky Blue 4B
Benzo Red Blue G, R
Brilliant Azurine B, 5G, 2R, 5R
Brilliant Benzo Blue 6B, 6BS
Chicago Blue B, R
Congo Blue 2B
Diazo Blue 3R (Dev. A)
Diazo Blue Black
Diazo Navy Blue 3B (Dev. A)
Diazo Indigo Blue B, M, R, BR extra (Dev. A)
Diazo Red Blue 3R (Dev. A)
Diazurine B (Dev. A)

Violets: Azo Violet
Benzo Bordeaux 6B
Benzo Fast Violet R
Benzo Violet R
Chloramine Violet R
Congo Corinth B, G
Heliotrope BB

Browns: Benzo Brown B, BX, NBX, BR, G, NB, GG, D3G extra, RC, R extra, NBR, 5R
Benzo Chrome Brown B, BS, G, R, 3R, 5G
Benzo Dark Brown
Benzo Nitrol Brown, G, RO, 2R (Paranitraniline)
Cotton Brown I, II, III, IV
Diazo Brown G, (Dev. A.)
Diazo Brown R extra
Direct Bronze Brown
Direct Fast Brown B, GG
New Toluylene Brown B, BBO, M
Pluto Brown R, 2G, NB

Greys: Benzo Fast Black
Benzo Fast Grey

Blacks: Diazo Black 2B, BHN, BHN extra (Dev. A)
Direct Blue Black B, N
Direct Deep Black E, E extra, RW, RW extra, R, G, T
Pluto Black A extra conc., G, R, FR, F extra, F extra conc., L extra

Directions for Dyeing Linen and Half-linen.

A) Bleaching.

Linen and half-linen must be boiled with 5—10% soda or bleached before dyeing.

According to A. Schott's patented method the linen is boiled in aqueous sulphurous acid, whereby the impurities of the linen fibre are transformed in the sulphurous acid into sulphite double compounds soluble in water. The purified yarn is then thoroughly washed in water, then treated in a chlore bath, washed and dried. (See also under No. 265.)

B) Dyeing.

Linen and half-linen are dyed with Benzidine colours in the same way as cotton for 1 hour at the boil (See pages 4—12). As linen yarns are difficult to penetrate it is advisable to cause the colour to fall on as slowly as possible, which can be done by adding soap to the dye bath. Dye first with the addition of 1—2% soda ash and 2—3% soap for ½ hour at the boil, then add 10—30% Glauber's salt crystals and boil up again.

265. **Mordant colours** which are adapted for the **printing** of **linen** and **half-linen:**

Reds: Alizarine Red in paste (Alumina)
Brilliant Chrome Red in paste (Chrome)

Oranges: Alizarine Orange G, R, GG, RP in paste (Alumina)

Yellows: Chrome Yellow in paste
Chrome Yellow D

Greens: Alizarine Green DG in paste, V in paste and in powder (Chrome)
Alizarine Green in paste and in powder, S, SW in paste (Chrome)

Blues: Alizarine Blue S, SR, S extra, SR extra in paste and in powder, SW in powder (Chrome)
Alizarine Blue SAP in paste (Chrome)
Alizarine Blue SP, BAG in paste and in powder (Chrome)
Chrome Blue in paste (Chrome)
Celestine Blue B (Chrome)

Violets: Chrome Violet in paste (Chrome)
Galleine in paste (Chrome)

Browns: Alizarine BXP in paste (Chrome) (Alumina)
Alizarine Orange G, R, GG, RP in paste (Chrome)
Alizarine Purpurine in paste (Chrome)
Alizarine Red in paste (Chrome)
Anthracene Brown G, GG, R, RP in paste (Chrome)

Greys: Alizarine Black B and 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)

Blacks: Alizarine Black B, 3B in paste and in powder (Chrome)
Alizarine Black IA in paste and in powder (Chrome)

For printing purposes it is best to employ linen or half-linen that has been grassed and treated with bleaching powder, see preceding page. Linen or half-linen is, as a rule, printed in the same way as cotton, (See under No. 44, page 84 and under No. 45, page 90).

British gum or starch tragacanth is used as thickening agent. For Alizarine Blue S or Alizarine Green S employ, as in cotton printing, neutral, for other mordant colours acid thickening.

a) With Alumina Mordant.

Directions for Printing Alizarine Red.

The recipe is exactly the same as described on page 84 under No. 44 for the printing of cotton.

b) With Chrome Mordant.

Recipe for printing Alizarine Blue.

Mix:

20	oz.	or 200 grms.	**Alizarine Blue S paste**
3 3/4	pints	» 740 »	starch tragacanth thickening (K)
1	oz.	» 10 »	potassium sulphocyanide and
1	nogg.	» 50 »	acetate of chrome 32° Tw.
		1000 grms.	

General Recipe for Printing.

Dissolve:

3 oz.	or 30 grms.	**Mordant colour powder** or	in 30 oz or 300 grms. paste 10%
5 2/5 noggs.	» 270 »	water, thicken with	
3 pints	» 600 »	British gum solution 750 : 1000, add	
2/5 nogg.	» 20 »	acetic acid 9° Tw. (30%), then add	
1 3/5 noggs.	» 80 »	acetate of chrome 32% Tw.	
	1000 grms.		

Linen and half-linen can be oiled, the same as cotton, before printing, with a solution of Turkey Red oil (See recipe under No. 44, page 85).

Steam the printed pieces for 1 hour without pressure, chalk, wash and soap slightly at 85° Faht. Some colours, such as Alizarine Red can or rather must be scrooped at 140° Faht. or higher.

266. **Basic colours** which are adapted for the **printing** of **linen** and **half-linen:**

Reds: *Rhodamine B, G, B extra, G extra
Rhoduline Red B, GD in paste
*Saffranine FF extra
Oranges: Coriphosphine O, OX, OX extra
Yellows: *Auramine O, I, II, concentrated
Greens: *Brilliant Green Cryst.
Blues: Blue 8336 (Navy Blue)
*Methylene Blue BB
New Fast Blue F
Turquoise Blue BB. G
Violets: Brilliant Rhoduline Purple R
Methyl Violet 1R—7B
Rhoduline Heliotrope B, 3B
Rhoduline Violet
Browns: Bismarck Brown F, R extra
Greys: New Fast Grey
Blacks: Jute Coal Black S
Jute Black B

* Those basic colours marked with an asterisk are also employed for dyeing linen.

General Recipe for Printing.

Boil:

2 oz.	or 20 grms.	**Basic colour**	
2 1/4 pints	» 450 »	water	
1 1/3 noggs.	» 70 »	acetic acid 9° (30%) and	
1 1/2 pints	» 300 »	British gum; when cold add	
3/4 »	» 150 »	acetic acid tannic acid solution 1 : 1	
	1000 grms.		

Steam for 1 hour without pressure, run through a bath of tartar emetic at 120° Faht. (1 1/2 oz. per gallon water), wash and dry; if necessary, prior to this, soap slightly for 5 mins. at 85° Faht. and wash.

267 **Katigen colours** adapted for **dyeing linen** or **half-linen:**

Greens: Katigen Green 2B
Katigen Olive GN

Blues: Katigen Chrome Blue 2R
Katigen Indigo B extra, R extra, BW extra, RL extra

Browns: Katigen Brown V extra
Katigen Chrome Brown 5G
Katigen Yellow Brown GG
Katigen Black Brown N, N extra conc.

Greys: Katigen Black SW, 2B

Black: Katigen Blue Black B
Katigen Black SW, 2B, SW extra, SWR extra

Linen and half-linen are dyed in the same way as cotton, (See under No. 81, page 122), but as the colour does not penetrate so well on linen as on cotton, a darker shade is obtained with the corresponding amount of colour, therefore when dyeing pure linen about 40—50% less and for half-linen 20—30% less colour are required to produce the same shade as that obtained on cotton.

Jute.

268. Colours which are adapted for the **dyeing of jute:**

a) acid colours, b) basic colours, c) Benzidine colours, d) Katigen colours.

Reds: a. Bordeaux extra
Brilliant Croceine 3B
Croceine Scarlet 5B, 7B, 8B
Double Ponceau 4R
Fast Red A, BT
Jute Scarlet 3B extra, 3BH, 3G extra
Metanil Red 3B, 3B extra
New Red 5R, 3R
Rhodamine B, G, B extra, G extra
Scarlet 5375, 6523, R, 21511

b. Diamond Fuchsine
New Magenta
Saffranine FF extra

c. Benzo Fast Red L
Benzo Fast Scarlet 4BS, GS, 8BS
Benzo Purpurine 4B, 6B
Benzo Rhoduline Red B, 3B
Brilliant Congo R
Brilliant Purpurine 4B, R
Congo Red, 4R
Congo Rubine
Delta Purpurine 5B, 7B

Oranges: a. Croceine Scarlet G, R
Orange IIB

b. Chrysoidine G, R
Coriphosphine O, OX, OX extra

c. Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Pluto Orange G

Yellows: a. Indian Yellow G, R
Metanil Yellow, conc.
New Yellow extra conc.

b. Auramine II, I, O, conc.

c. Brilliant Yellow
Chrysamine G, R

Yellows: c. Chrysophenine G
Curcumine S
Direct Yellow R, R extra

Greens: a. Acid Green 3 B
Brilliant Acid Green 6B
b. Brilliant Green Cryst.
China Green Cryst.
Cotton Green
c. Benzo Dark Green B, GG
Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B
d. Katigen Green 2 B
Katigen Olive GN

Blues: a. Alkali Blue 1R—7B
Cotton Blue R—VI
Induline B
Soluble Blue I red shade, I green shade
Wool Blue N extra, R extra
b. Navy Blue R 20311
Methylene Blue BB, R, RR
New Blue D, R extra
New Victoria Blue B
c. Benzo Blue BX, 2R, 4R, RW
Benzo Fast Blue B
Benzo Navy Blue B
Benzo Red Blue G, R
Blue for Halfwool
Brilliant Azurine 2R, 5R
Brilliant Sulphon Azurine R
Chicago Blue B, G
Congo Blue 2B
d. Katigen Indigo RL extra

Violets: a. Acid Violet 4B extra, HW
b. Brilliant Rhoduline Purple R
Methyl Violet 1B, 5B
Rhoduline Heliotrope B
Rhoduline Violet
c. Azo Violet
Benzo Bordeaux 6B
Benzo Fast Violet R
Benzo Violet R

Violets: c. Chloramine Violet R
Congo Corinth B, G

Browns: b. Bismarck Brown R extra, F
Fashion Brown 20303, 20304
c. Benzo Brown NB, NBX, GG, RC, D3G extra, NBR, R extra, 5R
Benzo Chrome Brown B, G, R
Direct Fast Brown B, GG
Pluto Brown GG, NB, R
d. Katigen Yellow Brown GG

Greys: a. Nigrosine G, R
Induline B

Blacks: b. Jute Coal Black S
Jute Black B, 21513, 21839
Jute Deep Black 22730
c. Benzo Fast Black
Direct Blue Black B, 2B, N
Direct Deep Black E extra, EW extra, RW extra
Pluto Black A extra, 3B extra, BS extra, F extra, G
d. Katigen Black 2B, SW, SW extra, SWR extra, TG

Directions for Dyeing Jute.

A. Preliminary Treatment.

Jute is often dyed in the unbleached state, but for bright and clear shades it is necessary to bleach the jute before dyeing.

In order to clean the jute and make it absorptive for the wetting out process, it is necessary to boil it up first in water.

It is very difficult to obtain a perfect bleach on jute. The following method is given by Cross & Bevan: Treat for ½ hour with peroxide of hydrogene, ozen and 5% potassium permanganate, and after boiling the material for 1—2 hours with Borax, silicate of soda (1 lb. per 20 gallons) or soda run the material through a bath of bisulphite. According to A. Busch the following method has been found very useful: Steep the jute over night in luke warm water, in order to loosen the grease and other hard substances, then wring out, rinse, boil for ½ hour with about ¾ oz.

soda per gallon water, in order to remove the glutinous and greasy substances, then wring out again, rinse, bleach the jute for 10 hours in a solution of chloride of soda 0.7° Tw., wring out, acidulate for ½—1 hour in hydrochloric acid 0.7° Tw., squeeze out and wash well, then allow to lie for 1 hour in a solution of potassium permanganate (1 oz. per 2½ gallons water) squeeze out, rinse, enter a bath of sodium bisulphite for ½ hour (1 pint 72° Tw. per 1½ gallon), wash, soap and blue.

For bluing the following colours are the best adapted, Methylene Blue, Methyl Violet, Soluble Blue, Ultramarine, etc., the latter being the best suited. It is also advisable to soap the material, in order to produce a particularly soft handle on the jute yarn and to give it a shining appearance. Soap for 10 mins. in a luke warm soap solution (1 oz. per 1¼ gallon water). Ultramarine can also be added to the soap bath.

The loss in weight by the cleaning and bleaching processes is generally about 15%.

A simpler method of bleaching which is often applied, especially for jute yarns, is the following: Boil the yarn in water as above described (or additional boiling with 5% soda), allow to lie for several hours in a solution of chloride of lime 0.7° Tw., working the yarn several times, wring out and rinse well in running water.

B) Dyeing
a) with Acid colours.

Acid colours are often preferred for the dyeing of jute as they penetrate the material well and produce shades fast to light.

Dye for ½—¾ hour at the boil with the well dissolved Acid colour and the addition of 2—5 % alum, work several times in the dye bath, and allow to fill up for another ½ hour in the cooling down liquor. The shades are as a rule not fast to water.

Occasionally Acid colours are dyed for 1 hour at 195° Faht. with the addition of 1 oz. sulphuric acid 141° Tw. and 10 oz. Glauber's salt crystals per 6¼ gallons liquor, but this method does not offer the security as to the stability of the fibre as alum does.

Remarks: As the jute fibre has great affinity to lime compounds, the water must be free from lime, otherwise calcareous water must be first corrected with acetic acid in order to prevent the jute becoming hard. For water of 6¼° hardness take about 1 pint acetic acid and for water of about 12½° 2 pints per 310 gallons water.

b) with Basic colours.

Basic colours dye jute without any mordant, as the jute itself contains certain compounds similar to tannin. It is advisable to dye with the well dissolved and filtered colour and, especially for light shades and mixtures, with the addition of ½—2% alum; enter the material in the bath only luke warm, and then raise the temperature slowly from 100° Faht. to 160—180° Faht. whereby the shades obtained are dyed level. It is useful in some cases to add the well dissolved and filtered colour to the dye bath in several portions, and oftentimes 1—2% oxalic acid are added as well, whereby on raw jute very bright shades, which are especially important for reds, are obtained.

c) with Benzidine colours.

Benzidine colours are dyed in several ways on jute. Direct Deep Black E extra and RW extra are for instance dyed for ½ hour at the boil with the addition of 10—20% Glauber's salt crystals and then rinsed slightly. Benzo Purpurines are dyed for 1 hour at the boil with the addition of 10% Glauber's salt crystals, Congo Corinth in a boiling bath with the addition of 10% common salt. As the bath is not exhausted it can be replenished with one third less the original quantity taken and used for subsequent lots. The shades are remarkable for their good fastness to water, are as a rule fast to rubbing, the colour penetrates well and the material has a soft handle.

Shades produced with Benzidine colours can be shaded with Basic dyestuffs.

d) with Katigen colours.

The recipe given for the dyeing of cotton applies to the dyeing of jute, with the exception that the addition of soda must be omitted, and according to the quality and nature of the jute the temperature of the dye bath be correspondingly reduced.

269. **Acid colours** adapted for **printing jute:**

Reds: Brilliant Croceine 3 B
Croceine Scarlet 1 B, 2 B, 3 B, 5 B, 8 B
Double Ponceau 4 R
Imperial Scarlet 1 B, 3 B
Jute Scarlet 3 B extra, 3 G extra, 21 511
Metanil Red 3 B, 3 B extra
Orange R

Oranges: Croceine Orange G
Mandarine G

Yellows: Metanil Yellow, conc.

The directions for cleaning and bleaching jute will be found on page 379, under No. 268.

Jute can also be bleached according to the following process. Steep the jute over night in a bath of ammonia soda at 140° Faht. (8 oz. per 25 gallons water), the next morning rinse and treat for 2 hours with 1 oz. permanganate of potash per 25 gallons water. Then allow to lie for 12 hours in a bath of sodium bisulphite and hydrochloric acid or aqueous sulphurous acid 3° Tw. and then rinse well. Permanganate of potash has less effect on the jute than chloride of lime.

General Recipe for Printing.

Dissolve:

3	oz.	or 30 grms.	**Acid colour** in	
6 1/2	noggs.	» 320 »	water and	
1	»	» 50 »	acetic acid 9° Tw. (30%)	stir this solution into
2 1/2	pints	» 500 »	acetic acid starch tragacanth	thickening (F) and add
1/2	»	» 100 »	acetate of alumina 15° Tw.	
		1000 grms.		

Steam for 1 hour without pressure. The prints are not fast to washing. The addition of acetate of alumina is absolutely necessary, for if it is not added to the printing paste the shades are not so bright but duller.

In order to obtain bright shades the jute can be run through stannate of soda, see page 383 under No. 270.

270. **Basic colours** which are adapted for the **printing** of **jute:**

Reds: Brilliant Rhoduline Red B
Diamond Fuchsine
Rhodamine B, G, B extra, G extra

Reds: Saffranine BB extra, FF extra
Oranges: Coriphosphine O, OX, OX extra
Crysoidine G
Yellows: Auramine II, I, O, conc.
Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Emerald Green Cryst.
Methyl Green I yellowish powder
Turquoise Blue BB, G
Blues: Cotton Blue IV, I, R
Methylene Blue BB
New Victoria Blue B
Rhoduline Blue R
Violets: Brilliant Rhoduline Purple R
Methyl Violet 5R—7B
Rhoduline Heliotrope B
Rhoduline Violet
Browns: Bismarck Brown M, F, FF, R extra
Blacks: Jute Coal Black S
Jute Black B, 21 839

Recipe for Printing.

The method for cleaning and bleaching jute will be found on pages 379 and 382 under No. 268 and 269.

General Recipe for Printing.

Dissolve:

2 oz.	or 20 grms.	**Basic colour**	in
3/4 pint	» 160 »		water and
1/2 »	» 100 »		acetic acid 9° Tw. (30%), thicken with
3 pints	» 600 »		acetic acid starch tragacanth thickening (A), and then add
2 2/5 noggs.	» 120 »		acetic acid tannic acid solution 1:1
	1000 grms.		

In order to obtain brighter shades pass the jute before printing through stannate of soda 3—4 1/2° Tw. Allow the pieces to remain in the rolled up state for several hours, then run through a bath of sulphuric acid 1 1/2—2° Tw., wash well and dry. It is advisable to brush the goods well, beat them and calender before printing, so as to obtain a pure and smooth print. Steam the printed goods for 1 hour without pressure.

271. **Benzidine colours** which are adapted for the **printing** of **jute:**

The colours under No. 40, pages 71 and 72 for cotton printing are suited for the printing of jute.

The directions for cleaning and bleaching jute will be found on page 379 under No. 268.

General Directions for Printing.

Boil:

3	oz.	or 30	grms.	**Benzidine colour**
9	»	» 90	»	wheat starch
1/2	pint	» 100	»	mucilage of tragacanth 65 : 1000 and
3 3/4	pints	» 750	»	water, and add
3	oz.	» 30	»	phosphate of soda
		1000	grms.	

Steam for 1 hour without pressure.

Ramie.

272. **Benzidine colours** which are adapted for the **dyeing** of **ramie:**

Reds: Benzo Fast Pink 2BL
Benzo Fast Scarlet 4BS, GS, 5BS, 8BS
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Fast Red GL, L
Benzo Rhoduline Red B
Benzo Red SG
Brilliant Congo R
Brilliant Geranine B, 3B
Brilliant Purpurine R
Congo Red 4R
Congo Rubine
Diazo Rubine B (Dev. A)
Delta Purpurine 5B, 7B,
Geranine BB, G
Hessian Purple N
Rose Azurine G

Oranges: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R
Pluto Orange G
Toluylene Orange G

Yellows: Brilliant Yellow
Chloramine Yellow GG, M
Chrysamine G
Chrysophenine G
Curcumine S
Direct Yellow R, R extra
Thiazole Yellow R, G

Greens: Benzo Dark Green B, GG
Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B

Blues: Azo Blue
Benzo Azurine G, 3G, R
Benzo Blue 2B, 3B, BX, RW, 2R, 4R
Benzo Chrome Black Blue B
Benzo Cyanine B, 3B, R
Benzo Fast Blue BN

Blues: Benzo Indigo Blue
Benzo Navy Blue B
Benzo Sky Blue 4 B
Benzo Red Blue G, R
Benzo Black Blue G, 5 G, R
Brilliant Azurine B, 5 G, 3 R, 2 R
Brilliant Benzo Blue 6 B, 6 BS
Chicago Blue B, R
Congo Blue 2 B
Diazo Blue (Dev. A)
Diazo Blue 3 R (Dev. A)
Diazo Blue Black
Diazo Navy Blue 3 B (Dev. A)
Diazo Ind go Blue B, M, R, BR extra (Dev. A)
Diazo Red Blue 3 R (Dev. A)
Diazurine B (Dev. A)

Violets: Azo Violet
Benzo Bordeaux 6 B
Benzo Fast Violet R
Benzo Violet R
Chloramine Violet R
Congo Corinth B, G
Heliotrope B B

Browns: Benzo Brown B, B X, D 3 G extra, NBX, BR, G, NB, GG, R extra, NBR, 5 R, RC
Benzo Chrome Brown B, BS, G, R, 3 R, 5 G
Benzo Dark Brown
Benzo Nitrol Brown G, R O, 2 R (Paranitraniline)
Cotton Brown I, II, III, IV
Diazo Brown G (Dev. A)
Diazo Brown R extra
Direct Bronze Brown
Direct Fast Brown B, G G
New Toluylene Brown B, BBO, M
Pluto Brown R, G G, N B

Greys: Benzo Fast Black
Benzo Fast Grey

Blacks: Diazo Black 2 B, BHN, BHN extra (Dev. A)
Diazo Fast Black BHX (Dev. A, Dev. F)
Direct Blue Black B, N

Blacks: Direct Deep Black E, E extra, R W, E W extra, R W extra, R, G, T
Pluto Black A extra conc., G, R, F R, F extra, F extra conc.

Directions for Dyeing.

Benzidine colours are dyed on ramie in the same way as on cotton for 1 hour at the boil with the addition of 20% Glauber's crystals and 2% soap, or with 10—20% common salt, or 5% potash and 2% soap, or 10% phosphate of soda and 2% soap, (See pages 44, etc. under Nos. 2—5, 9 and 14).

Leather.

273. Colours which are adapted for the **dyeing** of **calf, sheep** and **kid leather:**

a) basic dyestuffs, b) acid dyestuffs.

Reds: a. Brilliant Rhoduline Red B
New Magenta
Rhodamine B, B extra
Saffranine FF extra
b. Brilliant Croceine 3B
Bordeaux extra, G
Fast Red A
Croceine Scarlet 2BN, 8B
Imperial Scarlet 3B
Orange R
Scarlet 21511

Oranges: a. Chrysoidine Cryst.
Coriphosphine O, OX, OX extra
b. Croceine Orange G, R

Yellows: a. Auramine II, I, O, conc.
Auracine G
Canelle
Leather Yellow GO, O extra, GG, M, B, C
b. Indian Yellow G, R
Quinoline Yellow
Naphtole Yellow S

Greens: a. *Brilliant Green Cryst.
China Green Cryst.
Leather Green O
Methyl Green I yellowish powder and Cryst.
b. Fast Green bluish
New Acid Green 3BX, GX
Acid Green BB extra, 3B, GG extra

Blues: a. Methylene Blue BB
New Blue R extra
Turquoise Blue BB, G
b. Cotton Blue II, III, IV
New Patent Blue GA, 4B
Wool Blue N extra

Violets: a. Methyl Violet (all brands)
Rhoduline Violet
b. Acid Violet HW, 4B extra

Browns: a. Bismarck Brown F, M, R extra
Leather Brown GG

* in use also for dyeing furs and rugs.

Browns: b. Fast Brown
Acid Anthracene Brown R
Greys: a. Induline L soluble in water
Blacks: a. Leather Black V, T, C
Leather Deep Black 22719, 22124
b. Nigrosine LT soluble in water
(for saddening black dyed leather in the finish)
Phenylamine Black 4B

Directions for Dyeing.

A) Preparatory Treatment.

An important factor in the preparing of leather is to free it from all substances still adhering to it from the tanning process: this is generally done by allowing the hides to lie for some time in running water, whereby all impurities are washed off.

After soaking the leather in this way for 3—4 hours treat in the drum containing 1—2 pails of water, according to the quantity of leather, then run off this liquor and add to the drum fresh luke warm water, and treat for another 10 mins. After ascertaining that the leather has the characteristic slippery handle, take it out of the drum.

It is necessary that the leather is freed in this manner from all superfluous tannins, as otherwise when dyeing, especially with Basic colours, spots are easily liable to form.

For the cleaning of sheep skin the following method can be recommended. Scour in the drum, containing a weak solution of soda (about ½% soda of the weight of the water) in order to remove any excess of tannin and grease, then rinse in the drum for 20—30 mins. with luke warm water*, afterwards run for 5 mins. through a bath containing 1 part sulphuric acid to 60 parts water at about 60° Faht. whereby all dirt and grease are removed from the skins. Rinse in cold clean water in order to wash out the sulphuric acid. For very dark shades it is not necessary to clean the skins with sulphuric acid. The skins are now ready for dyeing; enter them into the dye bath at 100—120° Faht. and dye until the dye liquor is quite cold.

*) If necessary tan again with sumach.

B) Dyeing.
a) With Basic colours.

Dye the well cleaned sumach tanned leather with ½–2 pints acetic acid per 100 gallons water, according to the hardness of the water. The colour is either brushed on at 75—120° Fahr. or the leather dipped in the solution. For the latter method of dyeing the skins are paired together and then drawn through the colour solution in the tray at 130° Fahr. for 6—8 mins. As a rule two baths are employed, and the colour solution is prepared by dissolving 4 oz. colour in ½ gallon water; take about ½ pint of this colour solution and dilute it with 3—4 times the amount of water. This diluted colour solution is used for dyeing the first pair of skins, afterwards they are dyed to a full deep shade in about ½ pint of the undiluted colour solution, rinsed in cold water and finally dried in the open air. The concentrated colour solution for the last bath is used for the preliminary dyeing of the next pair of skins, which are then dyed in turn in concentrated colour solution, and so on. The reason for dyeing first in a diluted colour solution is, that the colour is greedily absorbed by the leather, and if the colour solution is not thin, spots and flecky stripes would ensue. After the skins are dyed, rinse in luke warm water and stretch out, then oil with linseed oil, dry, if necessary rub in diluted milk, then albumen and finally dry.

Some Basic colours produce a metallic lustre, especially when dyed in dark shades, but this can be removed by running the skins through diluted acetic acid.

For saddening the shade, acetate of iron and occasionally bichrome are employed.

Skins with a hard grain, on which the colours do not fix well at once, should be previously mordanted with tartar emetic or antimony salt; borax also proves serviceable for softening the grain, particularly when the leather (chiefly kid or goat skin) still contains grease. Carbon tetrachloride or benzine can also be used for removing the grease.

B) With Acid colours.

Dye the leather at 130° Faht. in the well dissolved acid colour with the addition of ½ pint sulphuric acid 144° Tw. per 100 gallons water (5 ccm. per 6 litres).

Remarks: When dyeing with several colours, it is advisable to dye one colour after the other, as the resultant shade is then clearer.

374. Colours which are adapted for the **dyeing** of **chromed leather:**

a) Basic colours, b) Acid colours, c) Benzidine colours.

Reds: a. New Magenta
Saffranine FF extra
b. Bordeaux extra, BX, G
Brilliant Croceine 3B
Fast Red A

Oranges: a. Coriphosphine O, OX, OX extra
b. Croceine Orange G
Orange IIB

Yellows: a. Auracine G
Auramine II
Chrome Leather Yellow 21312
b. Indian Yellow G, R

Blues: b. Induline B
c. Benzo Fast Blue BN

Browns: b. Fast Brown

Blacks: c. Direct Deep Black RW extra
Pluto Black BS extra

Directions for Dyeing.

A) With Basic colours.

Chrome tanned leather is first treated with chalk, borax or ammonia to remove all acid from the skins, then treated in a tannin bath for ½ hour (Gambier or sumach). After the skins have been washed well dye them in the drum containing the well dissolved and filtered basic colour at about 120° Faht. or dye them in the tray in pairs.

B) With Acid colours.

Acid colours are dyed on chromed leather if a good penetration of the colour is required. Dye with the requisite quantity of well dissolved Acid colour at 110—120° Faht. for ½ hour, and finally add a little acetic acid.

C. With Benzidine colours.

Benzidine colours are dyed on chromed leather at 155—165° Faht. for ½ hour. The bath is completely exhausted.

After the skins have been dyed treat them in the drum for about ½ hour with an emulsion of olive oil soap and neat's foot oil or egg yolk, then stretch out, oil with neat's foot oil or linseed oil, and then allow to dry. Afterwards sam the leather in damp sawdust, stake it and wet it out with a strong solution of albumen.

Glue and Gelatine Dyeing.

275. **Dyestuffs** which are adapted for dyeing **glue** and **gelatine:**

Reds: Acid Magenta
Brilliant Croceine 3 B conc.
Rhodamine B extra, G extra

Oranges: Croceine Orange G
Direct Yellow R extra
Indian Yellow R
Metanil Yellow conc.
Naphtole Yellow S
Quinoline Yellow, extra

Greens: Acid Green L conc.

Blues: Alizarine Blue SKY
Brilliant Wool Blue B extra
New Patent Blue B, 4B, GA conc.
Wool Blue N extra conc., R extra conc.

Violets: Acid Violet 4BN extra, 8B extra, 1R extra

Browns: Benzo Chrome Brown B, G

Blacks: Nigrosine B conc., LT conc. (especially adapted for Gelatoid and spangles)

Dissolve the colour in the quantity of water necessary, filter the solution and add same to the material to be dyed.

Remarks: Although all colours easily soluble are adapted for the dyeing of glue and gelatine, it is advisable when dyeing glue that reacts strongly alkaline to employ colours fast to alkalies.

Paper.

276. Colours which are adapted for **dyeing mechanical** and **sulphite** wood pulp in the beater:
a) basic dyestuffs, b) acid dyestuffs,
c) Benzidine dyestuffs, d) Katigen dystuffs.

Reds: a. Brilliant Rhoduline Red B
Diamond Fuchsine small Cryst.
New Fuchsine
Rhodamine B, G, B extra, G extra
Saffranine FF extra, BB extra
b) Azo Eosine
Brilliant Croceine 3B, 3B conc.
Carmoisine B
Croceine Scarlet 3B, 5B, 8B, 9B, R
Eosine I bluish, S extra bluish
Eosine I yellowish, S extra yellowish
Metanil Red 3B, 3B extra
Orange R

Oranges: a. Chrysoidine Cryst.
b. Mandarine G
Orange IIB, GT

Yellows: a. Auracine G
Auramine II, O, conc.
b. Quinoline Yellow
Metanil Yellow concentrated, extra 22414
Naphtole Yellow S
c. Paper Yellow R extra

Greens: a. Brilliant Green Cryst.
China Green Cryst.
Cotton Green
b. Acid Green GG extra, 3B

Blues: a. Navy Blue RP
Methylene Blue BB
New Victoria Blue B
Paper Blue 2P, B in powder
Turquoise Blue G
Victoria Blue B
b. Alkali Blue 3B, 5B
Cotton Blue I, I conc., II, II conc., R, IV
Red Blue extra concentrated
Soluble Blue TB

Violets: a. Methyl Violet R, 3R, 5B, 2B, 1B
Rhoduline Violet

Violets: b. Acid Violet 4B extra
Browns: a. Bismarck Brown F concentrated, R extra, BB concentrated
d. Katigen Yellow Brown GG
Katigen Black Brown N
Greys: b. Nigrosine G, R, B
Paper Grey 21337
Blacks: a. Coal Black B
c. Paper Black T

Directions for Dyeing.

(The pulp consisting of 60% mechanical wood pulp and 40% sulphite wood).

For bright and pale blues, reds and greens it is best to employ bleached cellulose, but for browns and blacks unbleached cellulose can be employed.

Dye with colours that are easily soluble.

a) Dyeing with Basic colours.

Add to the paper pulp in the beater 2—4% sulphate of alumina dissolved in water, allow to run for several minutes, then add the well dissolved Basic colour, allow to run for 10 mins., then add 4% resin soap dissolved in water (obtained by saponifying 1 lb. colophony with 4 oz. soda in one gallon water).

When dyeing with combinations, add the several colours to the paper pulp one after the other.

The waste water is generally clear in about ¼ hour.

Remarks: When dyeing a combination of Paper Black T and Coal Black B, add the Paper Black T to the pulp first, then the sulphate of alumina, afterwards the Coal Black B and finally the resin soap.

b) Dyeing with Acid colours.

Acid colours are dyed in a similar manner to Basic dyestuffs by adding 4% sulphate of alumina dissolved in water, to the paper pulp, then the dissolved Acid colour and afterwards the resin soap.

Remarks: Paper pulp dyed with Acid colours should be topped with Basic dyestuffs. This method of dyeing is to be recommended, as the pulp is dyed more evenly, and when employing Basic colours unevenness of the dyed fibres (the mechanical and sulphite wood pulp) is almost entirely avoided.

c) Dyeing with Benzidine colours.

Benzidine colours are dyed in a similar manner to that stated on the preceding page for Acid colours.

d) Dyeing with Katigen colours.

Dye in the same way as stated on the preceding page for Basic dyestuffs with the addition of 5 % sulphate of alumina and 5 % resin soap.

277. Colours which are adapted for the **dyeing** of **blotting paper** and **mottled paper:**

Reds: Benzo Fast Scarlet 4BS
Benzo Purpurine 4B, 10B
Brilliant Geranine B, 3B
Geranine G

Oranges: Benzo Orange R
Chloramine Orange G
Congo Orange G
Pluto Orange G

Yellows: Chloramine Yellow GG
Chrysophenine G
Paper Yellow R extra
Thiazole Yellow G

Greens: Benzo Dark Green B, GG
Benzo Green G
Benzo Olive

Blues: Benzo Azurine G, R
Benzo Blue BX, 3B, RW
Benzo Indigo Blue
Benzo Sky Blue, conc.
Brilliant Azurine B
Brilliant Benzo Blue 6B

Violets: Benzo Violet R
Congo Corinth G
Heliotrope BB

Browns: Benzo Brown BX, NBR
Benzo Chrome Brown B, G, R, 3R, 5G

Greys: Benzo Fast Black

Blacks: Pluto Black A extra
Direct Blue Black B
Direct Deep Black E extra

Directions for Dyeing.

Dye the paper pulp cold for ¼ hour with the well dissolved Benzidine colour.

278. Colours which are adapted for **staining paper**:
a. basic dyestuffs, b. acid dyestuffs.

Reds: a. Diamond Fuchsine
Rhodamine B, G, B extra, G extra
Saffranine FF extra
b. Croceine Scarlet 1 B, 3 B, 5 B, 7 B, 10 B, 1 BX, 2 BX, 3 BX
Eosine I bluish, I yellowish, S extra yellowish, S extra bluish
Ponceau 2 R L

Oranges: a. Chrysoidine Cryst.
b. Mandarine G
Orange II B, G T

Yellows: a. Auramine II
b. Fast Light Yellow G
Fast Yellow extra
Indian Yellow G
Quinoline Yellow
Tartrazine

Greens: a. Brilliant Green 3 6 extra Cryst.
Methyl Green I bluish, I yellowish
b. Acid Green G G extra
Parrot Green

Violets: a. Methyl Violet 1 B, 3 B, 5 B, 7 B, 1 R, 3 R, 5 R

Browns: a. Bismark Brown R extra, F

Blacks: a. Coal Black B

Basic or Acid colours used for staining purposes are dissolved well in water, the colour solution carefully filtered and then brushed on. The stained paper is afterwards allowed to dry.

For Chromo glazed paper China clay, wax, etc. are used for filling up agents.

279. **Colours** adapted for dyeing white **tissue paper** for **paper flowers** in the **dye machine:**
a) basic dyestuffs, b) acid dyestuffs,
c. Benzidine dyestuffs.

Reds: a. New Magenta
Rhodamine B, B extra, G, G extra
Saffranine FF extra, BB extra
b. Brilliant Croceine 3 B, 3 B conc.
Croceine Scarlet 8 B
Eosine S extra yellowish, S extra bluish

Reds:	c.	Benzo Purpurine 4B
Oranges:	a.	Coriphosphine O
	b.	Croceine Orange G
		Orange II B
	c.	Congo Orange G
Yellows:	a.	Auramine O, I, II, conc.
	b.	Naphtole Yellow S
	c.	Chloramine Yellow GG
		Chrysophenine G
Greens:	a.	Brilliant Green Crystals
		Cotton Green
	b.	Acid Green (all brands)
Blues:	a.	Methylene Blue BB
		Victoria Blue B
	b.	Alkali Blue 1B—7B, 1R—6R
		Cotton Blue
		New Patent Blue B, 4B, GA
		Soluble Blue I green shade, I red shade
	c.	Benzo Sky Blue, conc.
Violets:	a.	Methyl Violet 1R—7B
	b.	Acid Violet (all brands)
	c.	Heliotrope BB
Browns:	c.	Bismarck Brown O conc., F conc., 22 194
Greys:	c.	Benzo Fast Black
Blacks:	c.	Direct Blue Black B
		Direct Deep Black E extra
		Paper Black T
		Pluto Black BS extra

Tissue paper is dyed in the machine by running the ready made paper through the concentrated colour solution, and then drying on hot cylinders.

Remarks: When dyeing combinations, care has to be taken to select colours that do not fall out of solution when employed in conjunction with one another.

280. **Acid colours** adapted for **machine dyeing ingrain paper** (for wall paper fast to light):

Reds: Brilliant Croceine 3 B
Oranges: Croceine Orange G
Yellows: Fast Light Yellow G
Greens: Alizarine Green CG extra and CE in powder
Blues: Alizarine Blue SAE in powder
Greys: Alizarine Black 3 B in powder

Dissolve the colour in boiling water, and dye the paper in the machine without any further addition whatever.

Straw Dyeing.

282. **Colours** which are adapted for **dyeing straw:**
a) basic dyestuffs, b) acid dyestuffs,
c) Benzidine dyestuffs.

Reds: a. Brilliant Rhoduline Red B
Diamond Fuchsine
New Fuchsine
Rhodamine B, G, B extra, G extra
Saffranine FF extra

Oranges: a. Chrysoidine G extra
Coriphosphine O, OX, OX extra

Yellows: a. Auracine G
Auramine O
Leather Yellow O extra, GG, M, B
b. Indian Yellow G, R

Greens: a. Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Olive 20305

Blues: a. Navy Blue F, R 20311
Navy Blue DR for straw
Navy Blue extra for straw
Methylene Blue BB, RR
New Blue D, R extra
New Victoria Blue B

Violets: a. Methyl Violet B, 5B
Rhoduline Violet
b. Acid Violet HW

Browns: a. Bismarck Brown F, M
Canelle
Fashion Brown 20304, 20303

Blacks: a. Jute Black B
Jute Coal Black S
Leather Black T
Straw Black 22395
c. Direct Deep Black E extra, RW extra
Pluto Black F extra, CF extra, L extra

Directions for Dyeing.

A. Bleaching.

If straw is to be dyed a dark shade it need not be bleached before dyeing but merely treated with soda ash. Italian or Tuskany straw is very dark, dirty and greasy, and therefore requires to be boiled longer than other qualities.

After the straw has been cleaned in the usual manner by boiling with soap, 2% soda or potash, freed from grease and washed, it can then be bleached in the stoving chamber, or bleached according to the process given by Königswarter & Ebell, see below, by allowing the straw to remain in the bleaching bath at 85—100° Faht. until it is thoroughly bleached. Afterwards rinse well in soft water, and should any yellow tint still have to be removed, then treat for a short time in a slightly acid bath, such as for instance in a solution of tartaric acid (or 1 oz. sulphuric acid 144° Tw. per 3¼ gallons water), or allow to hang for some time in the open air. Great care has to be taken in drying the straw, which always has to be done cold, as it will otherwise become brittle. After treating the straw in the acid solution, rinse well in clean water.

Bleaching liquor.

Dissolve 1½ lbs. oxalic acid in 10 gallons of cold water, which should be as soft as possible, and then under constant stirring add slowly 1 lb. of peroxide of soda. As the liquor is still acid, i. e. blue litmus paper is dyed red, add sufficient silicate of soda solution (about 1½ lbs. of 52—75° Tw.) that the liquor is just alkaline, dyeing red litmus paper slightly bluish.

The above bath can very well be used repeatedly.

According to the experience gained by the electro-chemical works »Natrium« certain disadvantages result by substituting oxalic acid with sulphuric acid.

In order to obtain a quicker bleach, the bath can be made somewhat stronger, e. g. for the same amounts stated take only half the amount of water.

B. Dyeing

a. with Basic colours.

It is best to employ Basic colours for the dyeing of straw, as the colours are almost entirely exhausted in the dye bath.

Enter the goods into the luke warm dye liquor, bring to the boil within 1/2 hour, and dye at this temperature for about 3 hours, rinse and dry.

b. with Acid colours.

When dyeing Indian Yellow G and R add to the dye bath 1/4—1/2 lb. sulphuric acid, and dye as described above for Basic colours. Afterwards rinse carefully, so as to entirely remove any sulphuric acid still contained in the goods.

c. with Benzidine colours.

Dye in exactly the same manner as described above for Basic colours.

Chip Plait Dyeing.

283. **Colours** which are adapted for **dyeing chip plait:**

a) basic dyestuffs, b) acid dyestuffs,
c) Benzidine dyestuffs, d) Katigen dyestuffs.

Reds: a. Brilliant Rhoduline Red B
Rhodamine B, G, B extra, G extra
Rhoduline Red G
Saffranine FF extra
b. Jute Scarlet 3 G extra
c. Benzo Purpurine 1 B, 4 B
Benzo Rhoduline Red B
Brilliant Geranine B, 3 B
Congo Rubine

Oranges: b. Croceine Orange G
Orange III B
c. Congo Orange G, R
Pluto Orange G

Yellows: a. Auramine II
b. Indian Yellow G, R
Metanil Yellow, conc.
c. Chloramine Yellow M, GG
Chrysamine R
Chrysophenine G

Greens: b. Acid Green 3 B
Brilliant Acid Green 6 B
New Acid Green 3 BX, G X
c. Benzo Dark Green B, GG
Benzo Olive
d. Katigen Green 2 B
Katigen Olive G N

Blues: a. Navy Blue R 20311
b. Cotton Blue R
Wool Blue N extra, R extra
c. Benzo Sky Blue 4 B
Brilliant Benzo Blue 6 B
Benzo Fast Blue B
Congo Blue 2 B

Blues: d. Katigen Indigo B extra, R extra
Violets: a. Rhoduline Violet
b. Acid Violet R extra, HW
c. Benzo Fast Violet R
Browns: a. Bismarck Brown M, F
b. Fast Brown
c. Benzo Brown G
d. Katigen Brown V extra
Katigen Yellow Brown GG conc.
Katigen Black Brown N
Greys: a. Nigrosine B
c. Benzo Fast Black
Blacks: a. Straw Black 22695
c. Direct Blue Black B
Direct Deep Black E extra, RW extra, EW extra
Pluto Black A extra, F extra
d. Katigen Black 2B
Katigen Blue Black 4B, R

Remarks. For the dyeing of all kinds of woods (e. g. matches) all basic colours such as Brilliant Rhoduline Red, Rhoduline Red, Diamond Fuchsine, Rhodamine, Brilliant Green, etc. can be employed.

Directions for Dyeing.

For light shades it is advisable to boil the material before dyeing.

a) Dyeing with Basic colours.

Enter the material at the boil and dye for 1—1½ hours at this temperature in the well dissolved Basic dyestuff without any further addition. Afterwards rinse well.

Remarks: Tandstickors are generally dyed with Rhodamine. (Wooden matches are now also dyed with Eosine S extra bluish).

b) Dyeing with Acid colours.

Enter the goods at the boil and dye for 1—1½ hours at this temperatu e in the well dissolved Acid colour with the addition of ½—1—2% sulphuric acid. Afterwards rinse well, until the chip-plait is entirely free from acid, as otherwise it would become brittle when dry.

c) Dyeing with Benzidine colours.

Benzidine colours are the best adapted for the dyeing of chip-plait as they penetrate the plaits very well, dye easily level and are generally faster to light than the Basic colours (without tannic acid). Enter the goods into the boiling dye liquor, dye for 1—1½ hours with the addition of 10% Glauber's salt crystals or 5% common salt. The Direct Deep Black extra brands are dyed with the addition of 20% Glauber's salt crystals and 2% soda ash. After dyeing rinse once.

d) Dyeing with Katigen colours.

Dissolve the Katigen colour together with the sulphide of soda in hot water, and add this colour solution to the cold dye bath containing soft water; the goods can be dyed either cold or at 100—120° Faht. When the desired shade is obtained, rinse well and acidulate with diluted acetic acid. The shades thus obtained are very fast to light. They can also be topped with Basic colours, and be after-treated with bichrome and copper sulphate to produce the corresponding shade as on cotton.

Coir Yarn and Coir Fibre.

284. **Colours** which are adapted for the **dyeing** of **coir yarn** and **coir fibres**:

a) basic dyestuffs, b) acid dyestuffs, c) Benzidine dyestuffs.

Reds: a. Brilliant Rhoduline Red B
Diamond Fuchsine
New Magenta
Rhodamine B, G, B extra, G extra
Saffranine FF extra
b. Brilliant Croceine 3B
Croceine Scarlet 7B
Double Ponceau 4R
Fast Red A
c. Benzo Purpurine 4B, 6B
Brilliant Congo G, R
Brilliant Purpurine 4B, R
Congo Rubine
Delta Purpurine 5B, 7B
Diamine Red B, 3B

Oranges: a. Chrysoidine G in powder
c. Benzo Orange R
Brilliant Orange G
Congo Orange G, R
Pluto Orange G

Yellows: a. Auramine II
Leather Yellow O extra
b. Indian Yellow G, R
c. Brilliant Yellow
Chrysamine G, R
Chrysophenine

Greens: a. Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Olive 21473
c. Benzo Dark Green B, GG

Greens: c. Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B
Blues: a. Cotton Blue R—VI
Methylene Blue BB
New Victoria Blue B
b. Wool Blue N extra, R extra
c. Benzo Blue RW, 2B, 3R, BX
Blue for Halfwool
Brilliant Benzo Blue 6B
Brilliant Sulphon Azurine R
Brilliant Azurine RR, 5R
Chicago Blue B, R
Congo Blue 2B
Violets: a. Methyl Violet 2B, 5R
c. Benzo Bordeaux 6B
Benzo Fast Violet R
Benzo Violet R
Congo Corinth B, G
Browns: a. Bismarck Brown F
Fashion Brown 20303, 20304
c. Benzo Brown NBX, NBR, 5R, BX, GG, R extra, D3G extra
Benzo Chrome Brown B, R
Direct Fast Brown B, GG
Pluto Brown NB
Greys: b. Nigrosine B
Blue Grey 20291
Blacks: a. Jute Coal Black S
Jute Deep Black 22730
c. Direct Deep Black E extra, EW extra, RW extra
Pluto Black BS extra, 3B extra, G

Directions for Dyeing.

Coir yarn and coir fibre are dyed either in the raw or in the bleached state. The material is cleaned in exactly the same way as jute (See page 379, under No. 268).

a) Dyeing with Basic colours.

Coir yarn and fibre are dyed with the addition of alum in a similar manner to that stated for jute; enter

the goods into the luke warm bath, and bring the bath slowly up to the boil (See page 380, under No. 268B).

b) Dyeing with Acid colours.

Dye with the addition of alum the same way as with Jute (See page 380, under No. 368a).

Acid colours penetrate much better than Basic colours.

c) Dyeing with Benzidine colours.

Dye in the same manner as described for Jute (See page 381, under No. 268c).

d) Dyeing with Katigen colours.

Dye in the same way as described for chip-plait (See page 416, under No. 283).

Lakes.

285. **Acid colours** adapted for the **lake manufacture** precipitated with **chloride of barium:**

Reds: Acid Magenta
Azo Cochineal
Azo Crimson S
Azo Eosine
Azo Phloxine 2G
Bordeaux extra, G
Brilliant Croceine 3B
Brilliant Double Ponceau 4R, 5R
Brilliant Double Scarlet 3R
Carmoisine B
Cochineal Scarlet PS
Croceine Scarlet 10B, 7BL
Double Ponceau 4R
Fast Red A, BT
Imperial Scarlet 3B (resisting chromic acid)
Jute Scarlet 3B extra
Ponceau 2RL, 5RL

Oranges: Croceine Orange G, R
Mandarine G
Orange IIB, GL

Yellows: Fast Yellow, extra
Fast Light Yellow G (remarkably fast to light)
Indian Yellow G, R
Metanil Yellow conc.
Naphtole Yellow S
Quinoline Yellow, extra
Tartrazine

Greens: Acid Green L, GG extra
Brilliant Acid Green 6B
Fast Green extra
Fast Light Green in powder
Naphtole Green B
New Acid Green 3BX, GX

Blues: Alizarine Blue SAP, SAE in powder
Alkali Blue 6B, R extra

Blues: Celestine Blue B
Cotton Blue R, I, II conc.
Fast Blue greenish
Fast Acid Blue B, B extra
Gallamine Blue in paste
Gallocyanine in powder and in paste
Induline B
Intensive Blue
Night Blue extra greenish
Navy Blue RP
New Patent Blue GA
Silk Blue BES extra concen.
Sulphon Acid Blue B, R
Soluble Blue 3B extra green shade
Wool Blue N extra

Violets: Acid Violet 4B extra, 1R extra, 8B extra
Alkali Violet R
Fast Acid Violet 10B
Victoria Violet 4BS

Browns: Fast Brown
Bordeaux extra

Greys: Acid Black 8B

Directions for Preparing Lakes.

The preceding list of Acid colours produce, with chloride of barium in conjunction with substrates, precipitated insoluble lakes. In this reaction bright dyed baryte salts are formed by the double decomposition from the soda salts, common salt remaining in solution.

The purity of the substrates, their degree of alkalinity and acid reaction, the concentration of the solution, the temperature, the sequence and duration of the mixing as well as the manner of stirring all play an important part in the results obtained

The precipitates can be obtained in two ways:

A) **Precipitation by chloride of barium on a ready prepared substrate** (e. g. Alumina Paste).

B) **Precipitation by chloride of barium in conjunction with sulphate of alumina, and soda eventually, to produce the formation of the substrate.**

Example for A (Red Lake).

Sieve:

5 Parts **Ponceau 2RL** dissolved in hot water 1 : 20 and
100 » alumina paste, then precipitate cold with
6 » chloride of barium 1 : 10.
After washing well, filter and dry.

Example for B (Green Lake).

Mix:

15 Parts sulphate of alumina 1 : 10 with a solution of
10 » Acid Green L dissolved in 10 times the amount of water precipitate with
32 » chloride of barium 1 : 20. On adding
6½ » soda ash 1 : 10 the alumina is also precipitated in the lake, thus producing a complete precipitation.

Remarks: The above recipes are of course merely examples for the production of the lakes, for as is well known each firm has its own method of working according to the experience gathered in precipitating the various colours.

Alumina Paste

a) of sulphate of alumina.

Dissolve:

3 lbs. or 3 kilos sulphate of alumina in
3½ galls. » 36 litres hot water, and precipitate at 140—150° Faht. with a solution of
1 lb. 6 oz. » 1 kilo 350 grms. soda ash dissolved in
1 gall. 1½ pints » 12 litres hot water. Wash cold 3 times and press out.

b) **of Alum.**

Dissolve:

3 lbs. or 3 kilos alum in
3 galls. » 30 litres hot water and precipitate at 140—150° Faht. with a solution of
1 lb. » 1005 grms. soda ash dissolved in
1 gall. » 10½ litres hot water. Wash cold 3 times and then press out.

286. **Alizarine colours** adapted for the **manufacture of lakes** (precipitated with alum, soda and Turkey-red oil):

Reds: Alizarine Purpurine in paste
Alizarine Red I extra new, IB extra, I extra, IIABB, RAN, SX extra, SX extra new, XGP, X, XP in paste, W, PS, WR extra in powder

Oranges: Alizarine Orange G in paste, R in paste and in powder

Yellows: Fast Printing Yellow R, 3G in powder
Anthracene Yellow in paste and in powder

Greens: Alizarine Green CG extra in paste and in powder
Alizarine Green S in paste

Blues: Alizarine Blue BAG, BAR in powder and in paste, SP in powder
Alizarine Blue COR in powder
Alizarine Blue SKY
Alizarine Blue SAP, SAE, SAC
Alizarine Blue S in paste
Alizarine Blue BRG, BR3G in paste and in powder

Violets: Alizarine BX, GX, GGX in paste
Alizarine Blue B, HJ, GII, NSG, B extra in paste, WRS, 3RS in powder
Alizarine Blue JR in paste and in powder
Alizarine Heliotrope R in paste
Galleine in paste and in powder

Browns: Anthracene Brown G, R in paste

Blacks: Alizarine Black IA in paste

Directions for the preparation of lakes.

Alizarine colours are generally precipitated with alum and often together with lime salts and Turkey Red oil, whereby a double lake colour of alumina and lime is obtained, which by the addition of Turkey Red oil is rendered more brilliant.

As the Alizarine colours are very fast to light and water they are extensively employed for paints, as well as for lithographic inks, etc. Several Alizarine colours can be precipitated cold with chloride of barium, but most of them have to be boiled with an addition of

alumina and an addition of Turkey Red oil in order to develope them. Afterwards wash well in hot water, filter, press off, and dry at a moderate temperature.

Many lakes, e. g. Alizarine Red are rendered more fiery when they are boiled with pressure in certain steam boxes.

I.

Precipitate:

243 ccm. sulphate of alumina solution 1 : 10 with
125 ccm. soda solution 1 : 10

and wash out three times,

Precipitate:

30 ccm. calcium chloride solution 1 : 10 with
70 ccm. phosphate of soda solution 1 : 10

and wash out twice,

3 ccm. acetic acid solution 1 : 10.

II.

Dissolve or stir up:

30 parts Alizarine Red e. g. the brands I extra new, IB extra or SX extra new paste and
5 » Turkey Red Oil in a vessel free from iron with
5 » calcium chloride solution 1 : 10 and
2000 » water.

Then add I to II, and allow to remain for a long time and afterwards bring to the boil within 1 hour, and boil for several hours until the Red is completely developed.

The lakes are then well washed out several times and filtered.

The ingredients employed as well as the water must be free from iron. By the addition of chromic, tin or iron salts the shades of the lakes can be correspondingly altered.

Alizarine Red in particular is rendered more fiery by the addition of perchloride of tin.

287. **Benzidine colours** adapted for the **manufacture of lakes** (precipitated with **chloride** of **barium**):

Reds: Benzo Fast Red L
Benzo Fast Scarlet 4BS, 8BS
Benzo Rhoduline Red B
Benzo Fast Pink 2BL

Reds: Geranine G
Oranges: Benzo Fast Orange S
Chloramine Orange G
Yellows: Chloramine Yellow M
Chrysamine G, R
Direct Yellow R extra
Greens: Benzo Dark Green G G
Blues: Benzo Fast Blue B
Benzo Sky Blue, conc.
Brilliant Azurine B
Brilliant Benzo Blue 6 B
Violets: Benzo Fast Violet R
Chloramine Violet R
Browns: Benzo Brown G G, R extra
Benzo Chrome Brown G
Blacks: Benzo Chrome Black N
Direct Deep Black E extra, R W extra
Pluto Black A extra, 3 B extra, F extra

The preparing of Lakes.

Lakes from Benzidine colours are precipitated with chloride of barium in a similar manner as described for Acid dyestuffs.

Recipe A (Pink Lake).

Sieve:

5 parts **Geranine G** dissolved in
500 » hot water with
100 » alumina paste, and precipitate with
6 » chloride of barium dissolved in
60 » water.

After washing well, filter and dry.

Recipe B (Yellow Lake).

Dissolve:

5 parts **Chloramine Yellow M** in
500 » water, add
15 » sulphate of alumina dissolved in
150 » water, add
7 » soda ash dissolved in
70 » water, and finally
24 » chloride of barium dissolved in
240 » water.

Precipitate cold.

288. **Katigen colours** adapted for the **manufacture of lakes** (precipitation with **barium chloride**):

Greens: Katigen Green 2B, 4B
Katigen Olive GN
Blues: Katigen Indigo R extra
Browns: Katigen Yellow Brown GG
Katigen Black Brown N
Blacks: Katigen Blue Black B
Katigen Black SW extra, TG

289. **Basic colours**, adapted for the **manufacture** of **lakes** (precipitated with **tannic acid**):

Reds: Brilliant Rhoduline Red B
New Magenta
Rhodamine B, G, B extra, G extra
Rhoduline Red G
Saffranine FF extra
Oranges: Chrysoidine G, R Crystals
Coriphosphine O
Yellows: Auramine O
Greens: Brilliant Green Cryst.
China Green Cryst.
Cotton Green
Blues: Methylene Blue BB
New Victoria Blue B
Turquoise Blue BB
Victoria Blue B
Violets: Methyl Violet 1R—7B
Rhoduline Violet
Rhoduline Heliotrope B
Browns: Bismarck Brown R extra, M, BB conc., F conc., O, 22 194

The preparation of Lakes.

When precipitating Basic colours with tannic acid it is absolutely necessary, in order to obtain bright lakes, to employ ingredients that are **free from iron**, as otherwise the lakes are dull owing to the action of the tannate of iron.

In preparing lakes with tannic acid stir up the substrates with water into a paste, then add the Basic colour solution, and finally the tannic acid solution

under constant stirring. To precipitate the lake completely add tartar emetic, especially when the lake is intended for lithographic purposes.

Recipe for Green Lake.

Stir to a paste:
150 parts alumina paste in water and mix with
8 » **Brilliant Green Crystals** dissolved in
800 » water. Add
10 » tannic acid dissolved in
100 » water, then add
5 » tartar emetic dissolved in
100 » water.

Remarks: When employing basic colours, dark shades are obtained by adding sulphate of iron or perchloride of iron.

290. **Colours** which are adapted for the **production of lakes** (precipitated with **nitrate of lead** and **acetate of lead**):

Reds: Eosine S extra bluish
Eosine S extra yellowish
Eosine I bluish
Eosine I yellowish

Directions for the production of Lakes.

Eosine Colours in conjunction with salts of lead, lead acetate or nitrate of lead, produce particularly fine dyed lead lakes. It has to be remembered, that these lead lakes are poisonous, and are further very susceptible to the action of sulphuretted hydrogene, whereby the lead lakes are rendered browner. The substrates employed are, orange lead, alumina paste, barytes, white lead, lead sulphate.

Recipe for Eosine Lead Lake.

Mix:
100 parts Alumina paste and
15 » **Eosine** dissolved in
1500 » water, and then precipitate cold with
10 » nitrate of lead (or
12 » sugar of lead) dissolved in
120 » water.

When precipitating cold the shades are finer than when doing so warm.

Wash once, filter and dry. When drying, the temperature should be kept as low as possible, at all events it should never get about 120° Faht. as otherwise the shade becomes brownish.

By employing 50 parts red oxide of lead as substrate an imitation of cinnabar (Vermilion) is obtained, and with 100 parts alumina paste as substrate geranium lakes are obtained. As the Eosines are very susceptible to acids, the shades of the Eosine lakes can be rendered yellower or bluer according to the more or less acid reaction of the substrates employed.

291. **Products** for the manufacture of **lakes,** obtained by precipitation:

Reds: Paranitraniline (Beta Naphtole) and (Naphtole AR)
Paranitraniline S (Beta Naphtole) and Naphtole AR)

Blues: Dianisidine Base (Beta Naphtole) Dianisidine salt (Beta Naphtole)

Browns: Alpha Naphtylamine (Beta Naphtole)
Benzidine Base (Beta Naphtole)

Directions for producing Lakes from Paranitraniline.

A.

Stir up well:

200 grms. Paranitraniline S or 100 grms. Paranitraniline Base in

150 c.m. hydrochloric acid 32—34° Tw., and after a few minutes stir in

2 litres boiling water; boil up for a short time with the admission of steam until the Paranitraniline has become perfectly dissolved. Pour this solution slowly and in a fine stream into

4 litres of water as cold as possible at the same time stirring up constantly. The temperature of the liquor thus mixed should be at the most 50° Faht. Then pour in quickly and in a heavy stream also under constant stirring

55 grms. sodium nitrite dissolved in

½ litre cold water. After a few minutes a clear

diazo solution ensues. If the solution should appear very turbid it can be attributed either to the temperature being too high or the addition of nitrite solution not having taken place quickly enough or to insufficient nitrite. The latter can easily be ascertained by dipping in a piece of iodide starch paper which should turn blue, even if the diazo solution has been allowed to stand for sometime.

B.

Stir up:

115 grms. Beta Naphtole in
265 ccm. caustic soda 72° Tw. and dissolve in
1/2 litre boiling water, then add
60 grms. Turkey Red oil and
125 grms. soda ash.

C.

Dissolve:

243 grms. sulphate of alumina in
2 1/2 litres water.

Pour simultaneously solutions A (Paranitraniline) and C (sulphate of alumina) in a fine stream into the solution B (Beta Naphtole). Then wash several times, filter and dry.

Lakes soluble in spirit.

292. **Colours** which are adapted for **dyeing** of **lakes soluble in spirit:**

Reds: Diamond Fuchsine
Eosine I yellowish concentrated
New Magenta
Rhodamine B extra, G extra
Oranges: Chrysoidine Cryst.
Yellows: Auramine concentrated
Quinoline Yellow soluble in spirit
Leather Yellow G G
Naphtylamine Yellow
Metanil Yellow concentrated
Greens: Brilliant Green extra Cryst.
China Green Cryst.
Cotton Green
Blues: Blue soluble in spirit, blue shade
Blue soluble in spirit, green shade
Blue soluble in spirit, red shade
Victoria Blue B
Violets: Methyl Violet 1 B, 5 B, 5 R
Rhoduline Violet concentrated
Browns: Bismarck Brown soluble in spirit
Greys: Nigrosine S R T soluble in spirit
Blacks: Nigrosine S R T soluble in spirit
Nigrosine 12 230, 12 231

For spirit lakes the colours must be easily soluble in alcohol or amylic alcohol. Dissolve according to the shade required 5—30 grms. colour in 1 litre alcohol or amylic alcohol, clear the solution, if necessary by allowing to stand, then filter and mix it with 1 litre capsule lake (prepared by dissolving 625 grms. sandarac, 175 grms. Venetian turpentine, etc. in 1 litre alcohol at a moderately warm temperature under constant agitation.)

The ready prepared spirit lake can then be brushed uniformly on to tin plate, wood, glas, celluloid, bronze, etc. taking care to dry at only a moderately warm temperature.

Ink.

293. **Colours** adapted for the **manufacture of ink:**

Reds: Brilliant Croceine 3 B
*Diamond Fuchsine
Eosine S extra yellowish, S extra bluish
I yellowish, I bluish
New Magenta
Rhodamine B extra, G extra

Oranges: Croceine Orange G, R
Mandarine G

Yellows: Auramine O

Greens: Acid Green G G extra, 3 B
*Brilliant Green Cryst.
*China Green Cryst.

Blues: Blue 4830
Cotton Blue II, IV
Methylene Blue B B
New Patent Blue B, 4 B, G A

Violets: *Methyl Violet 1 B, 5 B

Browns: Bismarck Brown F, R, R extra

Greys: Nigrosine B, G

Blacks: Nigrosine B concentrated, L T soluble in water
Jute Black 21 839

For the dyeing of **ordinary** writing inks coal-tar colours, easily soluble in water, are generally employed, and for **copying inks** add as hygroscopical agents sugar, dextrine, syrup, glucose, a little glycerine etc.; for **hectographic inks** take a larger quantity of glycerine. As preserving agents add a little carbolic acid, salicylic acid, etc.

Example for a red Ink.

Dissolve:

1 oz. or 100 grms. **Eosine S extra yellowish** in
5 pints » 1000 » distilled water, and stir this slowly into a hot solution of
1 oz. » 100 » gum arabic dissolved in
2 1/2 galls. » 4000 » hot distilled water.

*) Those colours marked with an asterisk are also suitable for hectographic and ruling inks.

Example for a Violet hectographic Ink.

Dissolve:

1	oz.	or	100	grms.	**Methyl Violet 1B** in
1/4	pint	»	50	»	acetic acid 9° Tw. (30%)
1/2	»	»	100	»	alcohol 96%
1/2	»	»	100	»	distilled water and
1/4	»	»	50	»	glycerine 48° Tw.

294. **Colours** adapted for **shading inks** made from **Gall-nut:**

Greens: Acid Green GB extra
Brilliant Acid Green 6B

Blues: Cotton Blue V
Night Blue extra greenish
Navy Blue RP
New Patent Blue B, 4B, GA

Blacks: Nigrosine B conc.

Dissolve the respective dyestuff well in a little water, and add the colour solution to the gall-nut ink.

Hair and Bristles.

295. **Colours** adapted for **dyeing horse hair** and **bristles:**

Blues: *Alizarine Blue SAP, SAC, SAE

Blacks: **Phenylamine Black 4B, T
**Acid Black 4BL, 8B, LD
**Wool Black B
***Direct Deep Black †E extra, EW extra, R, †RW extra

* Dye best with the addition of 10% Glauber's salt and 2% acetic acid. When dyeing with the addition of sulphuric acid uneven shades ensue, as the colour rushes on too quickly.

** Dye with the addition of sulphuric acid at the boil; the baths are completely exhausted.

*** Dye at the boil with the addition of 20% Glauber's salt and 2% soda, afterwards add 2% acetic acid and boil for 1/2 hour.

† Are also suited for the dyeing of cow hair felts.

Fibre, Sisal and Esparto.

296. **Colours** adapted for **dyeing fibre, sisal** and **esparto.**

a) Benzidine dyestuffs, b) basic dyestuffs, c) acid dyestuffs.

Reds: a. Benzo Purpurine 4B, 6B
b. Brilliant Rhoduline Red B
Diamond Fuchsine
New Magenta
Rhodamine B, G, B extra, G extra
Rhoduline Red B, G
Saffranine FF extra
c. Brilliant Croceine 3B
Eosine S extra bluish, S extra yellowish
Ponceau 2RL

Oranges: a. Benzo Fast Orange S
Benzo Orange R
b. Chrysoidine G, R
c. Croceine Orange G
Orange II B

Yellows: a. Chrysamine G
Chrysophenine G
b. Auracine G
Auramine O
c. Indian Yellow G, R

Greens: a. Benzo Dark Green B, GG
Benzo Green BB, G
b. Brilliant Green Crystals
China Green Crystals
c. Brilliant Acid Green 6B
Acid Green GG extra

Blues: a. Benzo Sky Blue, conc.
Brilliant Benzo Blue 6B
b. Methylene Blue BB
New Blue R extra
New Victoria Blue B
Victoria Blue B
Rhoduline Blue R

Blues: c. Fast Acid Blue B, B extra
Wool Blue N extra, R extra
Violets: b. Methyl Violet 1B and 5B
Rhodoline Violet
c. Acid Violet 4B extra, HW
Browns: a. Benzo Brown B, BR, BX, G, GG, NB, NBR, NBX, R extra, 5R, RC, D3G extra
Benzo Chrome Brown B, BS, CR, G, 5G, R, 3R
b. Bismarck Brown F, M
c. Fast Brown
Greys: b. New Fast Grey
Blacks: a. Direct Deep Black E extra, EW extra, RW extra
Pluto Black 3B extra, BS extra, CF extra,
b. Jute Black 21839
Jute Deep Black 22730

Directions for Dyeing.

Dye Fibre and Sisal with Benzidine colours at the boil with the addition of Glauber's salt, Basic colours in a neutral bath luke warm.

Esparto is generally dyed with Basic colours, but Acid colours can also be employed in a neutral bath or with the addition of about 2% acetic acid.

Sisal is dyed with Acid colours with the addition of about 2% acetic acid.

Candles,
Oil, Grease, Wax.

297. **Colours** adapted for the **dyeing** of **candles,** oils, grease and wax:

Reds: Brilliant Scarlet soluble in oil
Ceres Red 1—6
Diamond Fuchsine
Eosine S extra yellowish, S extra bluish
Rhodamine B extra, G extra
Saffranine FF extra

Oranges: Ceres Orange 1—4
Diamond Orange in powder

Yellows: Ceres Yellow 1—4

Greens: Alizarine Green C soluble in oil
Alizarine Green V soluble in oil
Brilliant Green Cryst.
Ceres Green 1 and 2

Blues: Alizarine Blue AS soluble in oil
Alizarine Blue SKY soluble in oil
Ceres Blue 1—3

Browns: Ceres Brown 1—4

Blacks: Nigrosine base 12230, 12231
Nigrosine 12811 bluish, 12784 reddish
Ceres Black 1

Warm up the oil, grease, wax etc. and add the colour solution to the material to be dyed.

Remarks: Sebates for dyeing grease, oils, etc. are prepared as follows:

Warm up on a boiling water bath
1 part **Nigrosine Base 12230** and
2 » oleine or stearine
then add this liquid paste to the grease or oil.

Soap.

298. **Colours** adapted for the **dyeing** of **soap:**

Reds: Brilliant Croceine 3 B
Brilliant Double Scarlet 3 R
†Eosine S extra yellowish*, S extra bluish, I bluish, I yellowish*
†*Rhodamine B, G

Oranges: *Croceine Orange G, R
Coriphosphine
*Mandarine G
*Orange II B

Yellows: *Indian Yellow G, R
*Fast Light Yellow G
†*Metanil Yellow
†*Quinoline Yellow

Greens: *Alizarine Green CG extra
Alkali Fast Green B
Fast Green extra
Fast Green extra bluish

Blues: Cotton Blue II
†*Induline B
New Patent Blue B, 4B, GA
Soluble Blue greenish
Soluble Blue reddish
Wool Blue N extra

Violets: Acid Violet H W
Fast Acid Violet 10 B

Browns: †Bismarck Brown F, M
Fast Brown
Acid Anthracene Brown R

Directions for Dyeing Soaps.

Dissolve well 1 ½—4 oz. colour in ½—1 pint hot water (if necessary with the addition of a little alcohol) and add this filtered colour solution to about 60 gallons liquid soap.

*) Are fast to astringent lyes.
†) Are adapted for the dyeing of perfumes.

Artificial and Natural Flowers.

299. **Colours** which are adapted for the **dyeing** of **artificial flowers:**

Reds: Benzo Purpurine 4B
Diamond Fuchsine
Eosine S extra yellowish and bluish
New Magenta
Rhodamine B, B extra, G, G extra
Saffranine FF extra

Oranges: Coriphosphine O
Leather Yellow GG

Yellows: Auracine G
Auramine O
Naphtole Yellow S

Greens: Acid Green GG extra, L
Brilliant Green Cryst.
Benzo Green G

Blues: Alkali Blue 1B—6R
Benzo Sky Blue, conc.
Cotton Blue R—VI
Methylene Blue BB
New Patent Blue B, 4B, GA
Soluble Blue I greenish
Soluble Blue I reddish
Victoria Blue B

Violets: Acid Violet 4B extra
Heliotrope BB
Methyl Violet 5R—7B

Browns: Bismarck Brown F, FF, M, R, R extra
Benzo Chrome Brown B, G

Greys: Benzo Fast Black

Blacks: Direct Blue Black B, 2B, N
Pluto Black BS extra

Directions for Dyeing.

Dissolve the colour in warm water or alcohol, and for **cotton** material dilute with cold water to the concentration required, but for **silk** material with equal parts of alcohol and cold water. The dyed material should be dried in cold or warm air.

300. **Colours** adapted for the **dyeing** of **natural flowers:**

Reds: New Magenta
Saffranine FF extra
Oranges: Chrysoidine Crystals
Coriphosphine O
Yellows: Auracine G
Auramine conc.
Greens: Brilliant Green Crystals
China Green Crystals
Blues: Methylene Blue BB
New Blue R
New Victoria Blue B
Victoria Blue B
Violets: Methyl Violet 1R—7B
Browns: Bismarck Brown F conc.
Blacks: Jute Black 21839
Coal Black B

Dye the flowers in the warm colour solution containing an addition of glycerine; occasionally they can also be dyed slightly acid. When they are nearly dry, rub them over with a little oil (or glycerine).

Colours for brightening mineral colours.

301. **Colours** adapted for the **dyeing** of **mineral colours:**

a) basic dyestuffs. b) acid dyestuffs.

Reds: a. Brilliant Rhoduline Red B
Diamond Fuchsine
New Magenta
Rhodamine B, G, S
Rhoduline Red B, G in powder, GD in powder
Saffranine A, B extra

b. Acid Magenta
Bordeaux extra
Brilliant Croceine 3 B
Brilliant Double Scarlet 3 R
Brilliant Ponceau 4 R, 5 R
Brilliant Purpurine R
Carmoisine B
Croceine Scarlet 7 BL
Fast Red A, BT
Eosine S extra bluish, S extra yellowish, I bluish
Imperial Scarlet 3 B
Jute Scarlet 3 B extra
Ponceau 2 RL, 5 RL

Oranges: a. Chrysoidine G, R
Coriphosphine O, OX, OX extra

b. Croceine Orange G, R
Mandarine G
Orange II B

Yellows: a. Auramine O, I, II conc.

b. Naphtole Yellow S
Quinoline Yellow
Tartrazine

Greens: a. Brilliant Green Crystals
China Green Crystals

Greens: a. Cotton Green
Emerald Green Crystals
Methyl Green I bluish, I yellowish, I extra yellowish, I extra bluish
b. Acid Green L, GG extra
Brilliant Acid Green 6B
Fast Green extra bluish
Fast Light Green
New Acid Green 3BX, GX

Blues: a. Brilliant Blue extra green shade
Methylene Blue B, BB, R, 2R
New Blue R
New Victoria Blue B
Rhoduline Blue R
Turquoise Blue BB, G
Victoria Blue B, 4R
b. Alkali Blue 6B, R extra
Cotton Blue R, I, IV, conc.
Fast Acid Blue B, B extra
Induline B
Intensive Blue
Navy Blue RP
New Patent Blue GA
Night Blue extra greenish
Soluble Blue 3B extra green shade
Wool Blue N extra

Violets: a. Brilliant Rhoduline Purple R
Methyl Violet 1R—5R, RB, 1B—7B
Rhoduline Heliotrope B, 3B
Rhoduline Violet
b. Acid Violet 4B extra, 6BN, 8B extra, R extra
Fast Acid Violet 10B

Browns: a. Bismarck Brown F, FF, M, R, R extra, L, L extra
Fashion Brown
b. Bordeaux extra
Fast Brown

Greys: a. New Fast Grey

Blacks: a. Jute Black B
Jute Coal Black S

Directions for Dyeing.

There are several different methods of staining pigments and minerals, e. g. the respective pigments, etc. can be stirred up with the colour solution, prepared by dissolving the colour in water, and afterwards dried, or the respective minerals (such as phosphate) can be ground up with the colour itself or the lake obtained from same.

Corozo- or ivory-nut and horn buttons.

302. **Colours** which are adapted for the **dyeing** of **thick shelled nut** and **horn buttons**:

a) Benzidine dyestuffs. b) basic dyestuffs.

Reds: a. Benzo Purpurine 1 B
b. *Diamond Fuchsine
New Magenta
Saffranine FF extra

Oranges: b. Chrysoidine R in powder
Coriphosphine O

Yellows: b. Auramine II

Greens: a. Benzo Olive
b. *Brilliant Green Crystals
China Green Crystals
Cotton Green

Blues: a. Brilliant Sulphon Azurine R
b. *Methylene Blue BB
New Blue R extra

Violets: a. Heliotrope BB
b. *Methyl Violet B. 5 B

Browns: b. *Bismarck Brown M

Greys: b. New Fast Grey

Blacks: b. Jute Coal Black S
Jute Black B
Leather Black V

Remarks: All substantive and Basic colours can, as a rule, be employed for this class of work.

Those colours marked with an asterisk are also adapted for the dyeing of billiard balls.

Directions for Dyeing.

a) with Benzidine colours.

Dye the buttons in the dye liquor containing 5—20 grms. Glauber's salt crystals per litre liquor and a little soap, commence luke warm, bring slowly to the

boil, and boil for about 1 hour. The goods must be boiled for a sufficiently long time, as the colour goes on the material very slowly.

b) with Basic colours.

Dye the buttons in the dye liquor without any further addition; for hard water, however, dye with the addition of a little acetic acid, and also stir the colour up with acetic acid. The temperature of the dye liquor should be at least 100—120° Faht. and dye as long as mentioned above for Benzidine colours. (Occasionally the goods are previously treated with a small amount of tannic acid and tartar emetic, especially for dark shades.)

Eggs.

303. **Basic colours** adapted for **dyeing Easter eggs:**

Reds: Brilliant Rhoduline Red B
Rhodamine B, G
Rhoduline Red B, G
Saffranine FF extra, B extra
Oranges: Coriphosphine O
Yellows: Auracine G
Auramine II
Greens: Brilliant Green Crystals
China Green Crystals
Cotton Green
Blues: Methylene Blue BB
New Victoria Blue B
Rhoduline Sky Blue BB
Victoria Blue B
Violets: Methyl Violet 1B—7B, RB, 1R—5R
Browns: Benzo Brown NBX
Bismarck Brown M, R extra
Fashion Brown 20303, 20304
Blacks: Jute Black 21839
Jute Deep Black 22730

After the eggs are boiled allow to lie for some time in a luke warm diluted colour solution.

Sealing-Wax.

304. **Colours** adapted for the **dyeing** of **sealing-wax:**

a) acid dyestuffs.

Reds: Azo Eosine SL extra
Brilliant Croceine 3 B
Croceine Scarlet 7 B
Ponceau 2 R L
Oranges: Croceine Orange G, R
Orange II B
Yellows: Fast Light Yellow G, 3 G
Indian Yellow R
Tartrazine
Greens: Acid Green G G extra, 3 B
Brilliant Acid Green 6 B
Blues: Cotton Blue R
Soluble Blue 3 B extra greenish
Wool Blue R extra, N extra
Violets: Acid Violet H W, 4 B extra
Browns: Fast Brown
Blacks: Phenylamine Black T, 4 B

b) dyestuffs the lakes of which do not bleed in 45 % alcohol.

Reds: Azo Eosine S L extra
Ponceau 2 R L
Yellows: Fast Light Yellow G, 3 G
Blues: Alizarine Blue S K Y
Alizarine Blue S A P
Cotton Blue I

Fur dyeing.

305. **Colours** adapted for **fur dyeing:**

Reds: Brilliant Rhoduline Red B
New Magenta
Rhodamine B, G
Rhoduline Red B, G
Saffranine F F extra

Oranges: Chrysoidine G, R Crystals
Coriphosphine O

Yellows: Auracine G
Auramine O

Greens: Brilliant Green Crystals
China Green Crystals
Cotton Green

Blues: Methylene Blue BB, R, R R
New Victoria Blue B
Rhoduline Blue R
Victoria Blue B

Browns: Bismarck Brown F, M, R extra

Violets: Methyl Violet 1 B, 5 B
Rhoduline Heliotrope B, 3 B
Rhoduline Violet

Wash the furs in luke warm water containing olive oil soap and ammonia, and then rinse well. Dye as a rule neutral with Basic colours at 85° Faht.

For Blacks the following recipe should be employed. Wash the furs well in the ordinary way, and then rinse well. Allow the furs to lie in a solution of 5 grms. bichrome per litre water, work several times, and allow to lie in this solution for about 6 hours. Afterwards rinse well again, and put into a solution of 3 grms. Meta-Phenylene Diamine and 2 grms. Para-Phenylene Diamine per litre water containing the addition of a little hydrochloric acid or vanadium chloride, work again for several minutes and allow to lie for about 6 hours in this solution. Take the furs out, rinse well and dry. It is also advantageous to rub the flesh side of the skins with kneat's foot oil, as the skins then remain soft.

Thickenings.

Thickening A.

Boil:

9 lbs.	or 142 grms.	wheat starch	
1 3/4 galls.	» 286 »	mucilage of tragacanth 65 : 1000	
13 1/2 pints	» 286 »	acetic acid 9° Tw. (30%)	and
1 3/4 galls.	» 286 »	water	
	1000 grms.		

Thickening F.

Boil:

9 lbs.	or 145 grms.	wheat starch	
1 1/4 »	» 20 »	light burnt starch	
5 pints	» 105 »	mucilage of tragacanth 65 : 1000	
5 »	» 105 »	acetic acid 9° Tw. (30%)	
1 1/4 »	» 25 »	olive oil	and
3 3/4 galls.	» 600 »	water	
	1000 grms.		

Thickening R.

Boil:

7 1/2 lbs.	or 120 grms.	wheat starch	
4 1/2 pints	» 90 »	acetic acid 9° Tw. (30%)	
2 »	» 40 »	olive oil	
7 1/2 »	» 150 »	mucilage of tragacanth 65 : 1000	and
3 3/4 galls.	» 600 »	water	
	1000 grms.		

Thickening K.

Boil:

9 1/2 lbs.	or 150 grms.	wheat starch	
25 pints	» 500 »	mucilage of tragacanth 65 : 1000	and
17 1/2 »	» 350 »	water	
	1000 grms.		

Thickening H.

Boil:

10 lbs.	or 160 grms.	light burnt starch	
3 3/4 »	» 60 »	wheat starch	
5 pints	» 100 »	mucilage of tragacanth 65 : 1000	
5 »	» 100 »	acetic acid 9° Tw. (30%)	
1 1/4 »	» 25 »	olive oil	and
3 1/2 galls.	» 555 »	water	
	1000 grms.		

Full and detailed particulars of the application and direction for dyeing our colours will be found in the following pattern books published by the Farbenfabriken vorm. Friedr. Bayer & Co., Elberfeld.

Discharge Printing on **cotton cloth dyed** with **Benzidine colours,** 1896, and Supplements I, II, III.

The application of the **Benzidine Colours** in all **branches** of **printing** No. 677, 1898.

The **Mordant Dyestuffs** of The Farbenfabriken vorm. Friedr. Bayer & Co., Elberfeld and their application to **printing** and **dyeing** No. 837, 1902.

The **Basic Dystuffs** of The Farbenfabriken vorm. Friedr. Bayer Co., Elberfeld and their application to **printing** and **dyeing.** No. 726, 1900.

Wool Dyeing and the application of same of the colours of The Farbenfabriken vorm. Friedr. Bayer & Co., Elberfeld. No. 672, 1898.

Half-Wool Dyeing and the application of same of the Colours of The Farbenfabriken vorm. Friedr. Bayer & Co, Elberfeld. No. 782, 1900 and supplements.

The **Katigen Colours** of The Farbenfabriken vorm. Friedr. Bayer & Co., Elberfeld. No. 902, 1902.

Half-Silk Dyeing. No. 953, 1903.

Conversion of Thermometer degrees.

C to R multiply by 4 and divide by 5;
C » F » » 9 » » » 5 then add 32;
R » C » » 5 » » » 4;
R » F » » 9 » » » 4, then add 32;
F » R first substract 32, then multiply by 4, and divide by 9;
F » C » » 32, » » by 5, divide by 9.

Table comparison between the Scales of Fahrenheit, Réaumur and the Centigrade.

Cent.	Faht.	Rmr.	Cent	Faht.	Rmr.
100	212	80	49	120,2	39,2
99	210,2	79,2	48	118,4	38,4
98	208,4	78,4	47	116,6	37,6
97	206,6	77,6	46	114,8	36,8
96	204,8	76,8	45	113	36
95	203	76	44	111,2	35,2
94	201,2	75,2	43	109,4	34,4
93	199,4	74,4	42	107,6	33,6
92	197,6	73,6	41	105,8	32,8
91	195,8	72,8	40	104	32
90	194	72	39	102,2	31,2
89	192,2	71,2	38	100,4	30,4
88	190,4	70,4	37	98,6	29,6
87	188,6	69,6	36	96,8	28,8
86	186,8	68,8	35	95	28
85	185	68	34	93,2	27,2
84	183,2	67,2	33	91,4	26,4
83	181,4	66,4	32	89,6	25,6
82	179,6	65,6	31	87,8	24,8
81	177,8	64,8	30	86	24
80	176	64	29	84,2	23,2
79	174,2	63,2	28	82,4	22,4
78	172,4	62,4	27	80,6	21,6
77	170,6	61,6	26	78,8	20,8
76	168,8	60,8	25	77	20
75	167	60	24	75,2	19,2
74	165,2	59,2	23	73,4	18,4
73	163,4	58,4	22	71,6	17,6
72	161,6	57,6	21	69,8	16,8
71	159,8	56,8	20	68	16
70	158	56	19	66,2	15,2
69	156,2	55,2	18	64,4	14,4
68	154,4	54,4	17	62,6	13,6
67	152,6	53,6	16	60,8	12,8
66	150,8	52,8	15	59	12
65	149	52	14	57,2	11,2
64	147,2	51,2	13	55,4	10,4
63	145,4	50,4	12	53,6	9,6
62	143,6	49,6	11	51,8	8,8
61	141,8	48,8	10	50	8
60	140	48	9	48,2	7,2
59	138,2	47,2	8	46,4	6,4
58	136,4	46,4	7	44,6	5,6
57	134,6	45,6	6	42,8	4,8
56	132,8	44,8	5	41	4
55	131	44	4	39,2	3,2
54	129,2	43,2	3	37,4	2,4
53	127,4	42,4	2	35,6	1,6
52	125,6	41,6	1	33,8	0,8
51	123,8	40,8	Zero	32	Zero
50	122	40			

Cent.	Faht.	Rmr.	Cent.	Faht.	Rmr.
1	30,2	0,8	26	14.8	20.8
2	28.4	1.6	27	16.6	21.6
3	26 6	2.4	28	18.4	22.4
4	24,8	3,2	29	20,2	23,2
5	23	4	30	22	24
6	21.2	4,8	31	23.8	24,8
7	19.4	5.6	32	25.6	25,6
8	17,6	6.4	33	27.4	26.4
9	15,8	7,2	34	29.2	27,2
10	14	8	35	31	28
11	12.2	8,8	36	32,8	28,8
12	10,4	9.6	37	34,6	29.6
13	8,6	10.4	38	36 4	30,4
14	6.8	11.2	39	38,2	31,2
15	5	12	40	40	32
16	3.2	12,8	41	41,8	32.8
17	1,4	13,6	42	43.6	33.6
18	—	14.4	43	45.4	34,4
19	2,2	15,2	44	47.2	35,2
20	4	16	45	49	36
21	5,8	16,8	46	50.8	36.8
22	7 6	17.6	47	52.6	37,6
23	9.4	18,4	48	54,4	38 4
24	11.2	19,2	49	56,2	39.2
25	13	20			

TABLE
of percentages of soda lye at 15° according to Lunge.

Specific gravity.	Degrees Baumé.	Degrees Twaddle.	Percentage Na O H.
1,007	1	1,4	0,61
1,014	2	2.8	1,20
1.022	3	4.4	2.00
1,029	4	5.8	2.71
1,036	5	7,2	3.35
1.045	6	9,0	4.00
1,052	7	10,4	4.26
1,060	8	12,0	5,29
1,067	9	13,4	5,87
1,075	10	15,0	6,55
1,083	11	16,6	7,31
1,091	12	18,2	8,00
1,100	13	20,0	8 68
1,108	14	21.6	9,42
1,116	15	23,2	10,06
1,125	16	25.0	10,97
1 134	17	26.8	11,84
1,142	18	28,4	12,64
1,152	19	30,4	13,55
1,162	20	32,4	14,37
1,171	21	34,2	15,13
1,180	22	36,0	15,91
1,190	23	38,0	16,77
1,200	24	40,0	17,67
1,210	25	42,0	18,58
1,220	26	44 0	19,58
1,231	27	46,2	20,59
1.241	28	48,2	21.42
1,252	29	50,4	22,64
1,263	30	52,6	23,67
1,274	31	54,8	24.81
1,285	32	57.0	25,80
1,297	33	59,4	26,83
1,308	34	61.6	27,80
1,320	35	64,0	28,83
1,332	36	66,4	29.93
1,345	37	69 0	31,22
1.357	38	71,4	32.47
1,370	39	74.0	33,69
1,383	40	76,6	34.96
1,397	41	79,4	36,25
1,410	42	82,0	37.47
1,424	43	84.8	38,80
1.438	44	87,6	39.99
1,453	45	90,6	41,41
1,468	46	93,6	42,83
1,483	47	96.6	44,38
1,498	48	99,6	46,15
1,514	49	102,8	47,60
1,530	50	106,0	49,02

TABLE

of the percentage of aqueous nitric acid at 15° C. according to Kolb.

Degrees Baumé	Specific gravity.	Percentage NO_3H.	Degrees Baumé.	Specific gravity.	Percentage NO_3H.
0	1,000	0,2	26	1,220	35,5
1	1,007	1,5	27	1,231	37,0
2	1,014	2,6	28	1,242	38,6
3	1,022	4,0	29	1,252	40,2
4	1,029	5,1	30	1,261	41,5
5	1,036	6,3	31	1,275	43,5
6	1,044	7,6	32	1,286	45,0
7	1,052	9,0	33	1,298	47,1
8	1,030	10,2	34	1,309	48,6
9	1,067	11,4	35	1,321	50,7
10	1,075	12,7	36	1,334	52,9
11	1,083	14,0	37	1,346	55,0
12	1,091	15,3	38	1,359	57,3
13	1,100	16,8	39	1,372	59,6
14	1,108	18,0	40	1,384	61,7
15	1,116	19,4	41	1,398	64,5
16	1,125	20,8	42	1,412	67,5
17	1,134	22,2	43	1,426	70,6
18	1,143	23,6	44	1,440	74,4
19	1,152	24,9	45	1,454	78,4
20	1,162	26,3	46	1,470	83,0
21	1,171	27,8	47	1,485	87,1
22	1,180	29,2	48	1,501	92,6
23	1,190	30,7	49	1,516	96,0
24	1,200	32,1	49,5	1,524	98,0
25	1,210	33,8	49,9	1,530	100,0

Volumetric weight of the aqueous solution of sulphurous acid at 15° C. (Scott).

Volumetric Weight.	Percentage SO_2	Volumetric Weight.	Percentage SO_2
1,0028	0,5	1,0302	5,5
1,0056	1,0	1,0328	6,0
1,0085	1,5	1,0353	6,5
1,0113	2,0	1,0377	7,0
1,0141	2,5	1,0401	7,5
1,0168	3,0	1,0426	8,0
1,0194	3,5	1,0450	8,5
1,0221	4,0	1,0474	9,0
1,0248	4,5	1,0497	9,5
1,0275	5,0	1,0520	10,0

TABLE
of percentage of hydrochloric acid according to Kolb.

Specific gravity.	Degrees Baumé.	Per cent Cl H.	Per cent Cl H 20° Bé.
1,000	0	0,0	0,3
1,007	1	1,4	4,7
1,014	2	2,7	9,0
1,022	3	4,2	14,1
1,029	4	5,5	18,1
1,036	5	6,9	22,8
1,044	6	8,4	27,8
1,052	7	9,9	32,6
1,060	8	11.4	37,6
1,067	9	12,7	41,9
1,075	10	14.2	46,9
1,083	11	15,7	51,6
1,091	12	17,2	56,7
1,100	13	18,9	62,3
1,108	14	20,4	67,3
1,116	15	21,9	72,3
1,125	16	23,6	77,6
1,134	17	25,2	83,3
1,143	18	27,0	88,9
1,152	19	28,7	94,5
1,157	19,5	29,7	97,7
1,161	20	30,4	100,0
1,166	20,5	31,4	103,3
1,171	21	32,3	106,1
1,175	21,5	33,0	108,6
1,180	22	34,1	111,7
1,185	22,5	35,1	115,2
1,190	23	36,1	118,6
1,195	23,5	37,1	122,0
1,199	24	38,0	124,6
1,205	24,5	39,1	130,0
1,210	25	40,2	132,7
1,212	25,5	41,7	134,3

TABLE

of percentage of acetic acid at 60° F.

according to Oudemanns.

Specific gravity.	Per cent $C_2H_4O_2$	Specific gravity.	Per cent $C_2H_4O_2$	Specific gravity.	Per cent $C_2H_4O_2$
0,9992	0	1,0459	34	1,0725	68
1,0007	1	1,0470	35	1,0729	69
1,0022	2	1,0481	36	1,0733	70
1,0037	3	1,0492	37	1,0737	71
1,0052	4	1,0502	38	1,0740	72
1,0067	5	1,0513	39	1,0742	73
1,0083	6	1,0523	40	1,0744	74
1,0098	7	1,0533	41	1,0746	75
1,0113	8	1,0543	42	1,0747	76
1,0127	9	1,0552	43	1,0748	77
1,0142	10	1,0562	44	1,0748	78
1,0157	11	1,0571	45	1,0748	79
1,0171	12	1,0580	46	1,0748	80
1,0185	13	1,0589	47	1,0747	81
1,0200	14	1,0597	48	1,0746	82
1,0214	15	1,0607	49	1,0744	83
1,0228	16	1,0615	50	1,0742	84
1,0242	17	1,0623	51	1,0739	85
1,0256	18	1,0631	52	1,0736	86
1,0270	19	1,0638	53	1,0731	87
1,0284	20	1,0646	54	1,0726	88
1,0298	21	1,0653	55	1,0720	89
1,0311	22	1,0660	56	1,0713	90
1,0324	23	1,0666	57	1,0705	91
1,0337	24	1,0673	58	1,0696	92
1,0350	25	1,0679	59	1,0686	93
1,0363	26	1,0685	60	1,0674	94
1,0375	27	1,0691	61	1,0660	95
1,0388	28	1,0697	62	1,0644	96
1,0400	29	1,0702	63	1,0625	97
1,0412	30	1,0707	64	1,0604	98
1,0424	31	1,0712	65	1,0580	99
1,0436	32	1,0717	66	1,0553	100
1,0447	33	1,0721	67		

Remarks. The specific gravity higher than 1·0553 is equivalent to two solutions of varying strength. To ascertain whether acid ($C^2H^4O^2$) exceeding the maximum density (78 percent) is present it is only required to add some water. Should the specific gravity increase the acid is stronger than 78 % but should it decrease the acid is weaker.

TABLE

of percentage of liquid ammonia at 57° F. according to Carius.

Specific gravity.	Per cent NH_3.	Specific gravity.	Per cent NH_3
0,9959	1	0,9283	19
0,9936	1,5	0,9267	19,5
0,9915	2	0,9251	20
0,9894	2,5	0,9236	20,5
0,9873	3	0,9221	21
0,9851	3,5	0,9206	21,5
0,9831	4	0,9191	22
0,9811	4,5	0,9177	22,5
0,9790	5	0,9162	23
0,9769	5,5	0,9147	23,5
0,9749	6	0,9133	24
0,9729	6,5	0,9119	24,5
0,9709	7	0,9106	25
0,9689	7,5	0,9092	25,5
0,9670	8	0,9078	26
0,9655	8,5	0,9065	26,5
0,9631	9	0,9052	27
0,9612	9,5	0,9038	27,5
0,9593	10	0,9026	28
0,9574	10,5	0,9013	28,5
0,9556	11	0,9001	29
0,9538	11,5	0,8988	29,5
0,9520	12	0,8976	30
0,9501	12,5	0,8964	30,5
0,9484	13	0,8953	31
0,9466	13,5	0,8940	31,5
0,9449	14	0,8929	32
0,9431	14,5	0,8918	32,5
0,9414	15	0,8907	33
0,9396	15,5	0,8896	33,5
0,9380	16	0,8885	34
0,9363	16,5	0,8874	34,5
0,9347	17	0,8864	35
0,9330	17,5	0,8854	35,5
0,9314	18	0,8844	36
0,9299	18,5		

TABLE

of percentage of sulphuric acid at 60° F. according to Kolb.

Specific gravity.	Degrees Baumé.	Per cent SO_4H_2	Specific gravity.	Degrees Baumé.	Per cent SO_4H_2
1,000	0	0,9	1,303	34	40,2
1,007	1	1,9	1,320	35	41,6
1,014	2	2,8	1,332	36	43,0
1,022	3	3,8	1,345	37	44,4
1,029	4	4,8	1,357	38	45,5
1,037	5	5,8	1,370	39	46,9
1,045	6	6,8	1,383	40	48,3
1,052	7	7,8	1,397	41	49,8
1,060	8	8,8	1,410	42	51,2
1,067	9	9,8	1,424	43	52,6
1,075	10	10,8	1,438	44	54,0
1,083	11	11,9	1,453	45	55,4
1,091	12	13,0	1,468	46	56,9
1,100	13	14,1	1,483	47	58,3
1,108	14	15,2	1,498	48	59,6
1,116	15	16,2	1,514	49	61,0
1,125	16	17,3	1,530	50	62,5
1,134	17	18,5	1,540	51	64,0
1,142	18	19,6	1,563	52	65,5
1,152	19	20,8	1,580	53	67,0
1,162	20	22,2	1,597	54	68,6
1,171	21	23,3	1,615	55	70,0
1,180	22	24,5	1,634	56	71,6
1,190	23	25,8	1,652	57	73,2
1,200	24	27,1	1,671	58	74,7
1,210	25	28,4	1,691	59	76,4
1,220	26	29,6	1,711	60	78,1
1,231	27	31 0	1,732	61	79,9
1,241	28	32,2	1,753	62	81,7
1,252	29	33,4	1,774	63	84,1
1,263	30	34,7	1,796	64	86,5
1,274	31	36,0	1,819	65	89,7
1,285	32	37,4	1,842	66	100,0
1,297	33	38,8			

Without guarantee.

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Tabular synopsis of the
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